March 1978

Smithsonian

Hard life of a tiny flower:
a woolly blue violet (p. 64)
blooms in springtime snow

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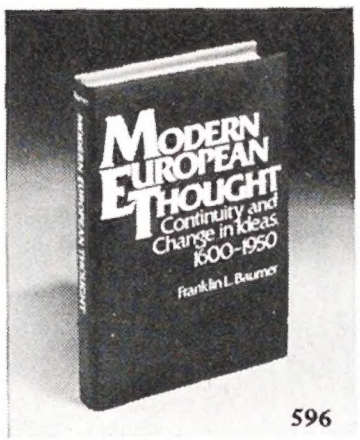

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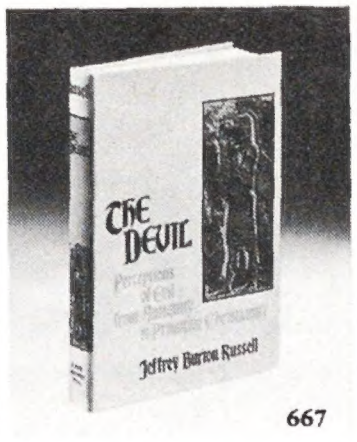

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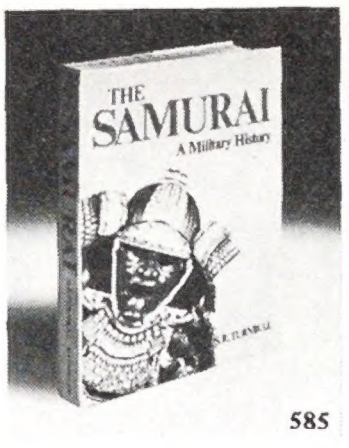

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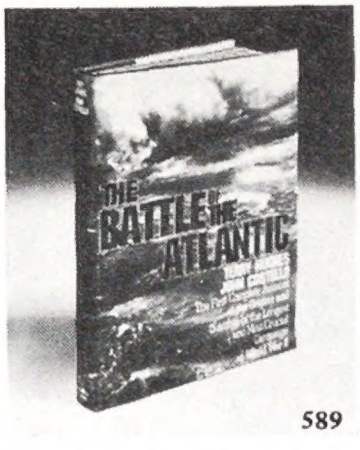

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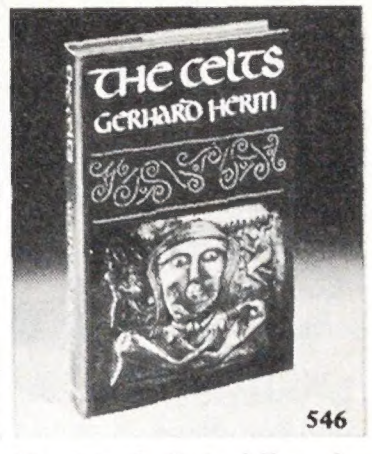

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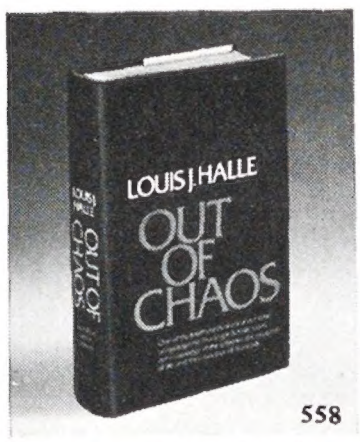

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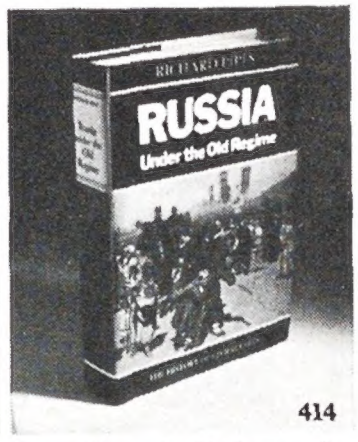

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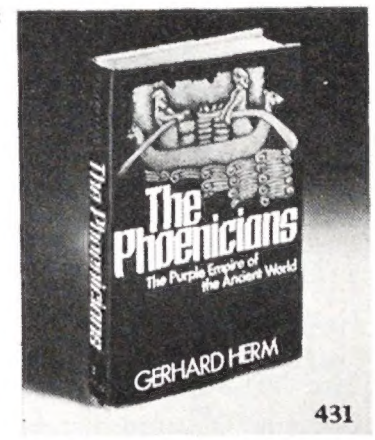

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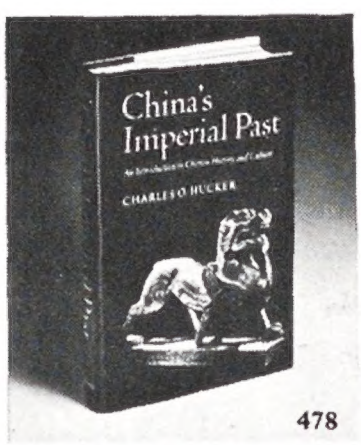

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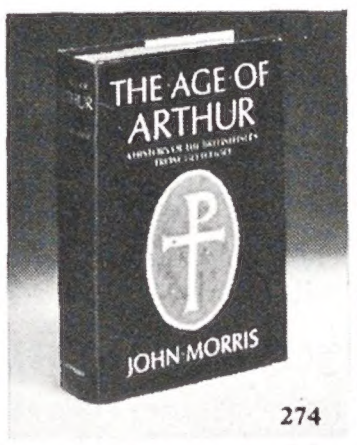

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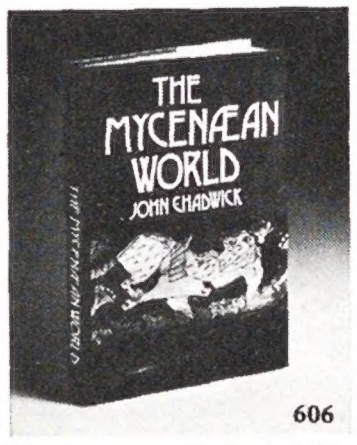

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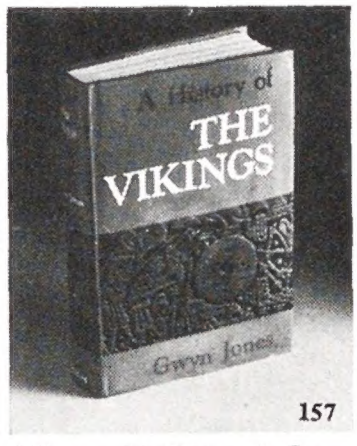

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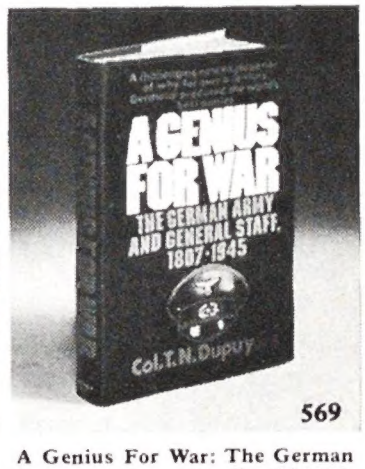

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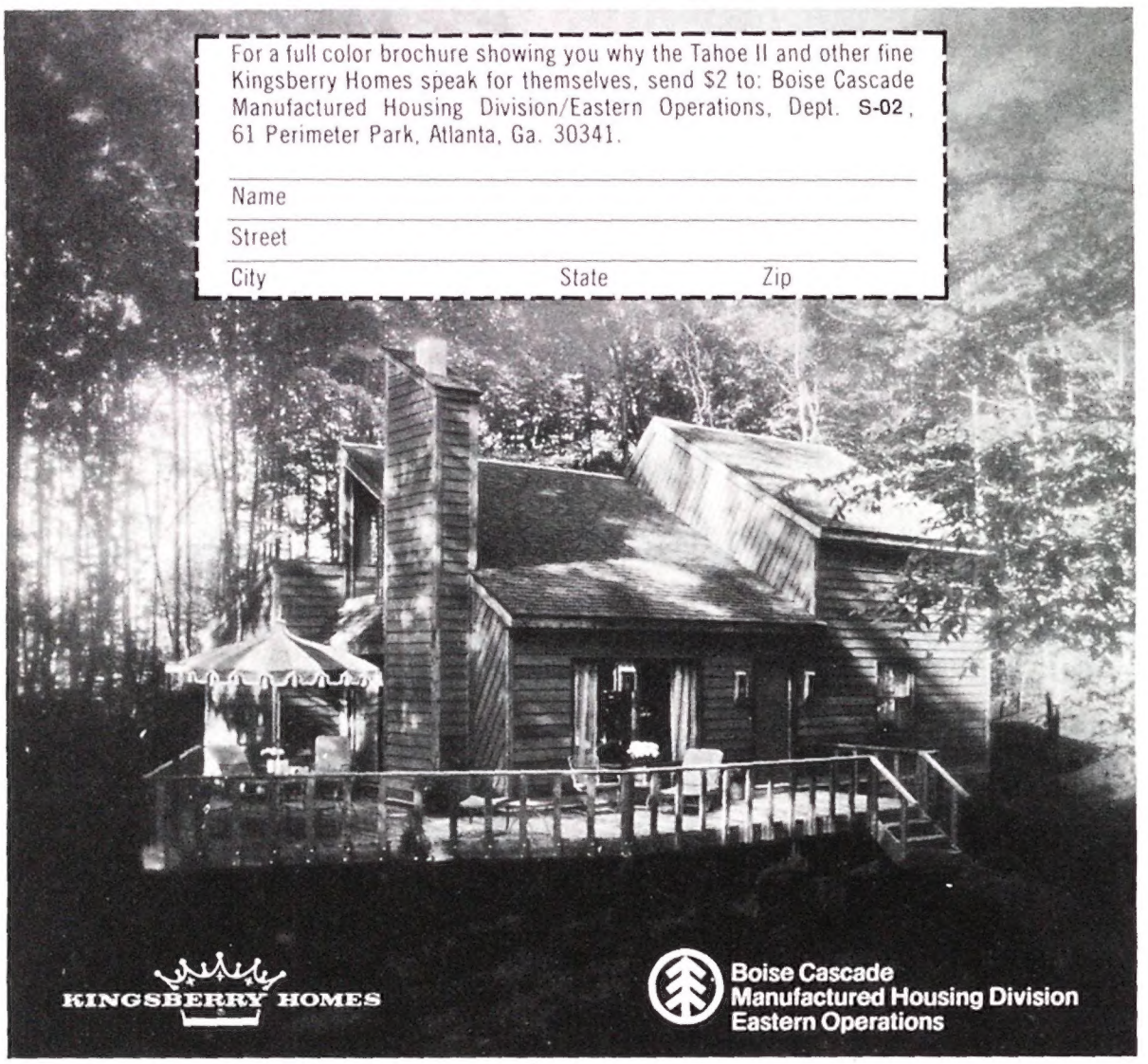
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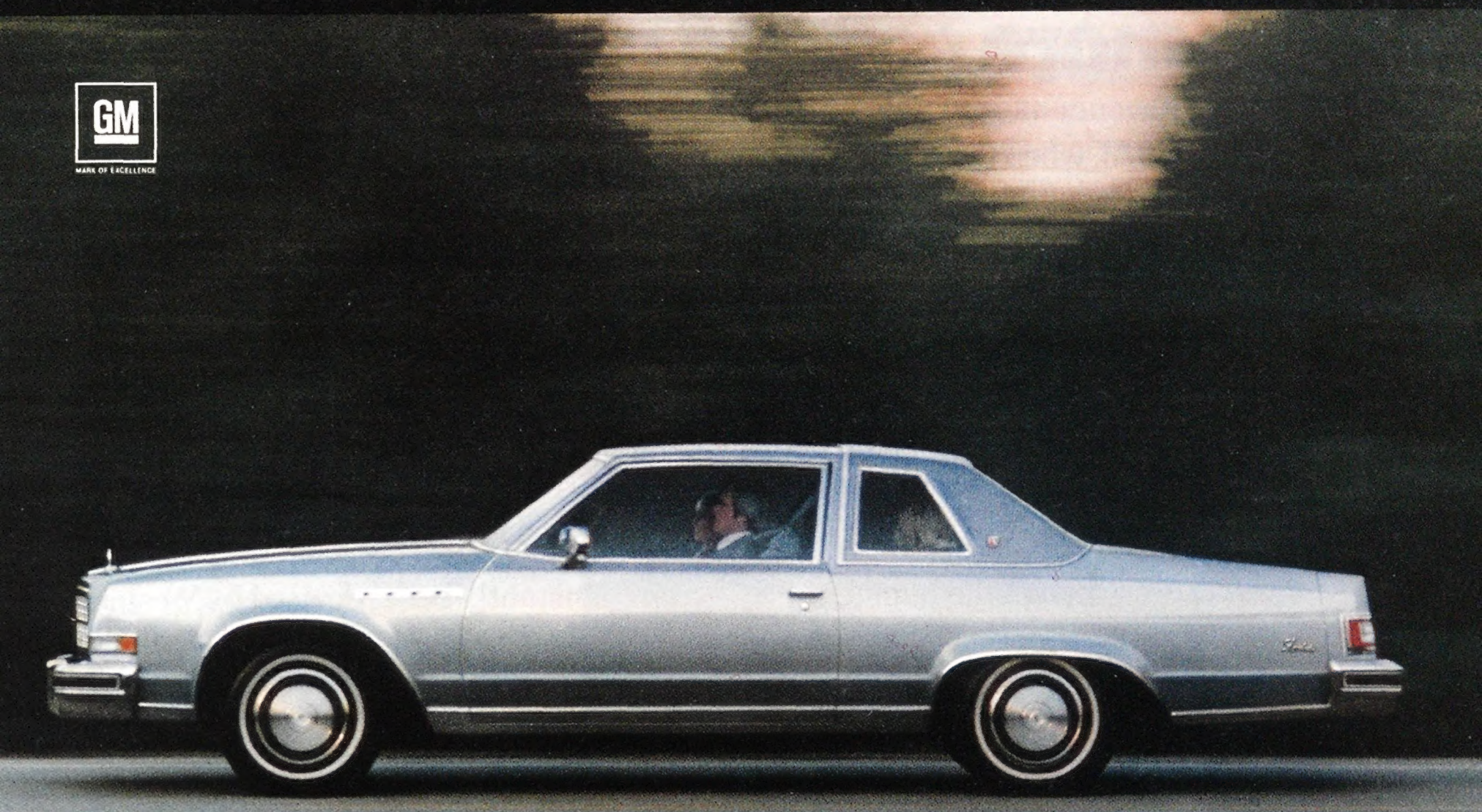

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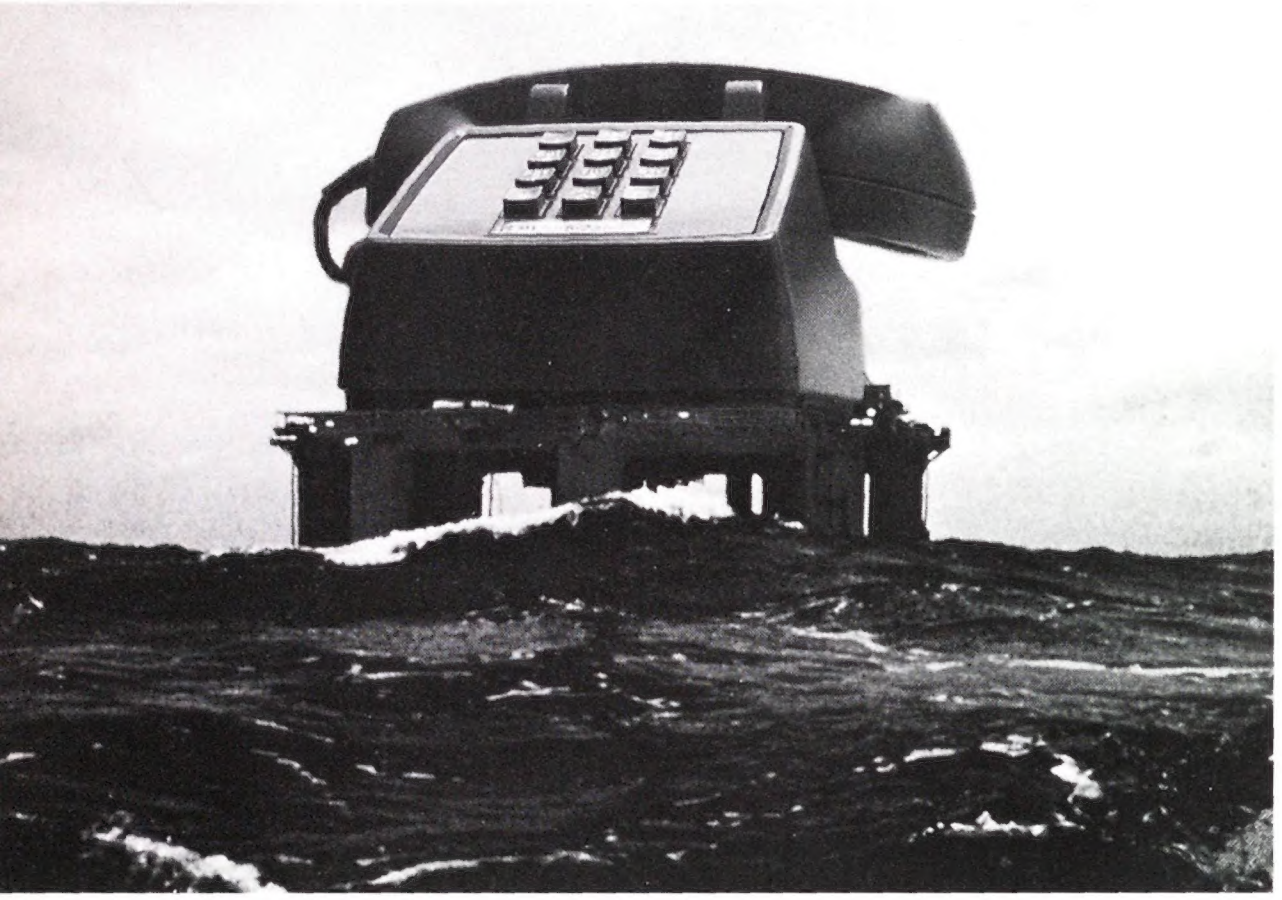
A report on a matter of public interest:

How the Bell System is pumping more service out of less oil.

In 1973, when the OPEC oil embargo went into effect, the Bell System committed itself to reducing its energy consumption. That commitment has been fulfilled. In four years, the Bell System has saved the energy equivalent of almost 24 million barrels of oil and over 415 million dollars in energy costs—savings that help hold down the cost of your telephone bills.

Today, the Bell System is actually using 11 per cent less energy than it did in 1973, even though the number of telephones in service has risen over 16 per cent and the volume of business has increased 33 per cent.



Here's how we are combining common sense with uncommon technology in four basic areas to achieve Zero Energy Growth.

Telephones are reconditioned three times.

The Bell System's energy needs begin with the power and fuel necessary to design and manufacture the basic communications components—cables, wire and equipment such as your home telephone.

In general, it takes much more energy to manufacture such items from scratch than it does to recycle them. Because Bell System equipment is designed by Bell Labs to be reliable, repairable *and* recyclable, extensive energy cutbacks have been realized through 40 years of recycling and reuse. New, more energy-efficient processes are constantly being devised by Western Electric, some of which entail modifying original designs for even greater materials and power savings.

Since 1974, the Bell conservation program has saved the energy equivalent of over three million barrels of oil by recycling metals. Also, more than six million equivalent barrels of oil have been saved through the reuse of equipment. The average telephone, for example, is reconditioned three times before it is unrepairable or obsolete.

New technology does more with less.

Another area in which the Bell System is effecting energy savings is in power for switching and transmission equipment. Constantly, new energy-saving technology is being added to the system. *Item:* Over two billion power-saving transistors, diodes and integrated circuits have been put into use. *Item:* Light Emitting Diodes (LEDs) are replacing incandescent bulbs in switchboards and telephones, saving over 90 per cent of the previously required power. *Item:* A new

microprocessor called MAC-8 is less than one-tenth the size of a postage stamp yet contains the equivalent of over 7,000 transistors. The MAC-8 can execute several hundred electronic "thinking" functions, yet it will operate on only one-tenth of a watt of power.

Smaller vehicles power giant fleet.

Twenty-two per cent of Bell's energy requirements are in fuel for its fleet of over 170,000 vehicles, the largest privately owned and operated motor fleet in the world. Here, a number of commonsense procedures have been adopted: engines are carefully tuned for peak efficiency, smaller and more fuel-efficient vehicles are being used, and shuttle services have been set up between some company locations. In addition, New York Telephone Company is experimenting with nonpolluting, energy-saving electric-powered trucks. Due to these and other efforts, the Bell System in 1976 used over five per cent less motor fuel than in 1973.

Even employees' body heat is used.

Heating, lighting and air conditioning of Bell System's 25,000 buildings account for 45 per cent of its energy needs. Broad economies have been achieved simply by removing thousands of unnecessary lights; by lowering temperature settings; by cutting back on hot water temperatures; and by heating or cooling unoccupied areas only to the extent required for equipment operations.

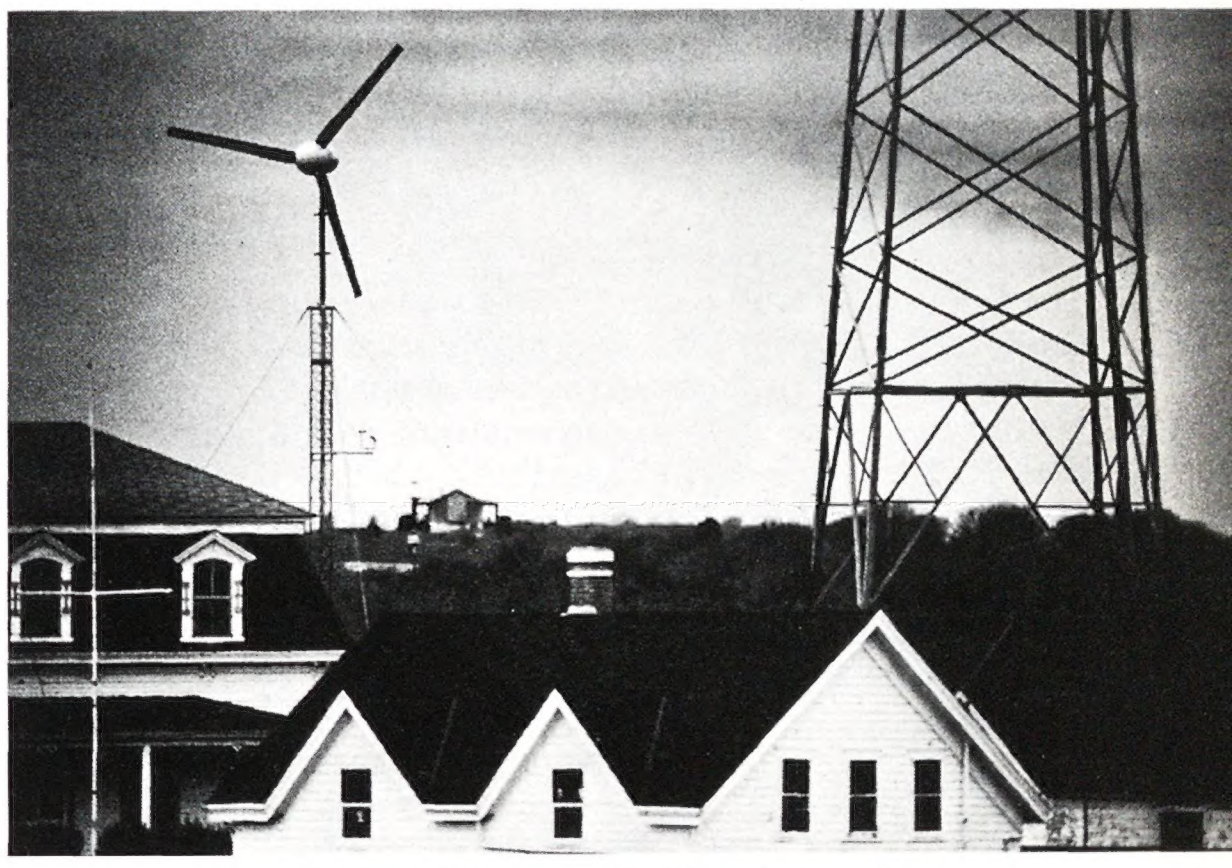
Moving beyond the obvious conservation measures, the Bell System created a building energy management program to redesign and retrofit existing buildings to improve their energy efficiency. Two examples of other power-saving programs at Bell facilities:

• On windy Block Island, Rhode Island, the New England Telephone Company began operating a wind dynamo in September, 1976. It can produce up to 15 kilowatts of electricity to power a central office and microwave radio terminal. Excess power from the windmill is fed back to the power company.

• In AT&T's new Basking Ridge, New Jersey, facility, an innovative computerized system heats about 1½ million feet of office space by recovering excess heat from the building environment—lights, equipment and the body heat of employees. It is estimated that the system uses 25 per cent less energy than conventional heating/cooling systems.

Bell trials of solar heating and cooling are providing valuable data which should lead to more widespread use of alternate energy systems.

Windmill helps power central phone office and microwave radio terminal (tower at right) on Block Island.



Today, throughout the Bell System, our commitment to energy conservation is more than a goal; it is an ongoing reality. And in looking to the future, we anticipate that in 1982 we will still be using no more energy than was used in 1973. *Keeping your phone system the best in the world.*

Bell System

The view from the castle

Despite believers in UFOs and nonbelievers in evolution, scientists must interpret evidence of the truth as they understand it

Our Smithsonian Museum of Natural History is dedicated to collecting and exhibiting materials from the plant and animal kingdoms and to demonstrating the truths suggested by these ever-accumulating records. The displays are the result of rigorous research performed by trained scientists who are constantly seeking objective evidence about a broad spectrum of phenomena. New data appear constantly. For example, recent studies on the large grazing herbivorous dinosaurs show that they appear to have possessed warm-blooded circulatory systems—a breakthrough in evolutionary thought—and discoveries in plate tectonics indicate that over the millennia the continents are shifting their positions on the Earth's surface. In the museum such information about the principles of the natural world is translated into exhibits.

Yet the exhibits at the Museum of Natural History and other Smithsonian museums have their critics. There is some public mistrust of scientific research today, and many people seek to promulgate superstition and pseudoscience (p. 54). A growing interest in science fiction and occult and paranormal phenomena has given a segment of the public the suspicion that scientists are holding something back. Some people appear to believe that certain of our National Air and Space Museum exhibits were designed to cushion the shock to the American public that government scientists had established contact with another civilization in space. If such were the case, we certainly would have developed a demonstration or exhibit! Similarly, if we had "little people" from a UFO on tap, we would show them. But we have no evidence of such phenomena, and a museum has a moral commitment to the truth as the best authorities see it. This commitment cannot be shaped by horoscope readings, nor can scientific truths be determined—as some people seem to believe—by laws or the interpretation thereof.

Perhaps others would have our exhibits take account of those who still do not believe in evolution. Some people may feel that our displays showing evolution are atheistic, antichristian or otherwise hostile to Bible teachings. I do not believe this for a moment. As a Christian I believe that the achievements of science in understanding the origin and evolution of our universe have only magnified our wonder in Creation. To seek to explain the natural world can hardly be described as antireligious.

Is it fear that engenders a retreat from science? Fear today lies everywhere—in our obsession with denying traditions and the old truths, as well as in our mistrust of new ideas. In a sensitive and prescient essay in a recent issue of *Harper's* on the necessity of those who live in a democracy to eschew fear of argument or dissension and to learn to live with debate and the evolution of ideas, Lewis H. Lapham calls for the revival of an "articulate minority" of people "who live for others and not for the opinion of others, who believe that they can forge their energy and their intelligence into the shapes of their own destiny and their own future."

Democracy involves continuing progress in the search for truth, and the search must be prosecuted with whatever skills we possess. We cannot disavow science any more than we can disclaim truth.

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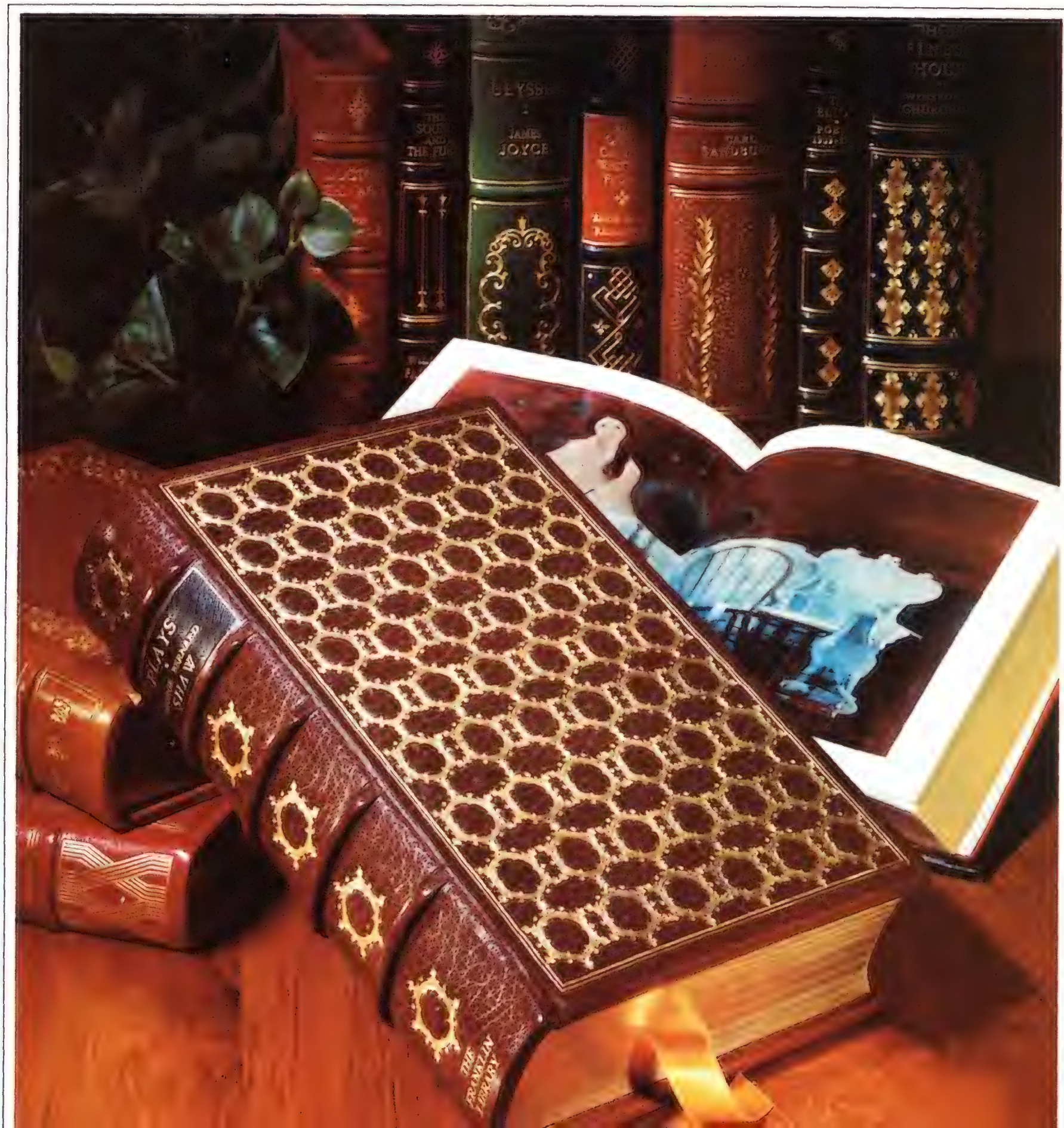

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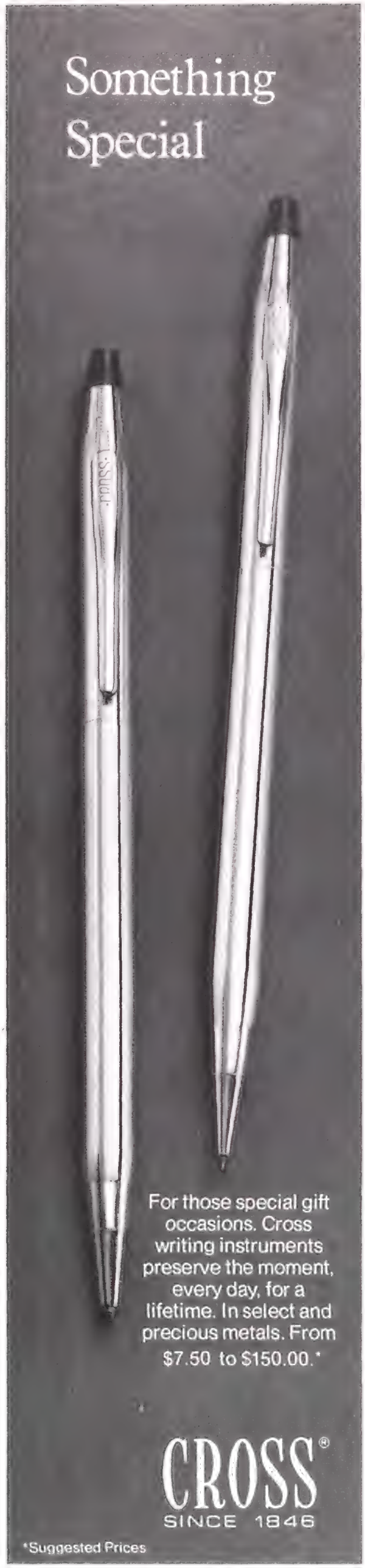
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Phenomena, comment and notes

New theory on how the pyramids were built, real visitors from space and a better weapon against fleas

A theory exists that life originated on this planet when lightning storms converted such molecules as water, methane and ammonia into a "primordial soup" of prebiotic molecules such as amino acids and carbohydrates. But, argue Sir Fred Hoyle and Chandra Wickramasinghe in *New Scientist* (Vol. 76, No. 1078), the soup would have been too thin. The concentrations of such molecules in lakes and oceans would not have been great enough to lead to the start of life.

Instead, they suggest, life could have begun when a comet struck Earth four billion years ago. The necessary prebiotic molecules exist out there in space and a comet could easily mop them up, alternately "cooking" and "freezing" them, as it were, into primitive organisms. Comet Kohoutek, that visual fizzle (SMITHSONIAN, February 1976), was found to contain several prebiotic molecules, as have certain meteorites.

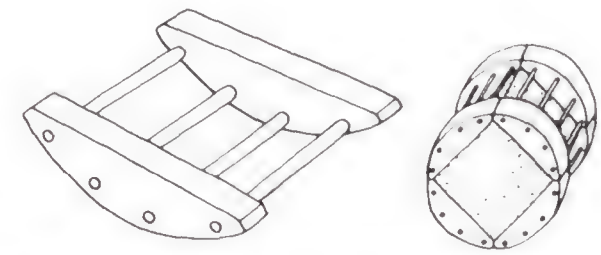
If life exists on comets, the scientists go on ominously, then we are very likely subject to regular invasions by forms of extraterrestrial life, because the Earth quite regularly passes through the debris and dust of comets. Take great epidemics of the past, such as the global influenza pandemic of 1918-19. It spread too fast, in their opinion, for human contact to have accomplished its transmission. When travel was slow, arduous and relatively uncommon, ancient pandemics could not, they say, have been accomplished merely by human contact, or human-to-animal contact.

The first clear description of an influenzalike disease was in the 17th century. The common cold is undescribed before the 15th century. Could not the pathogens for these diseases have arrived brand-new on the scene from cometary debris? And if that is the case, then it follows that further major epidemics could arise when the Earth crosses the path of new comets. Unhappily, the scientists have no remedy.

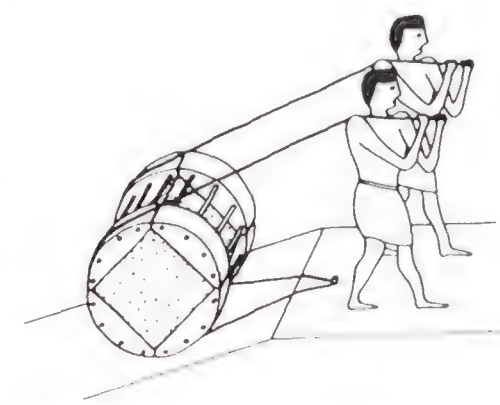
How the pyramids could have been built

A common notion of how the Egyptians built the pyramids is that some 100,000 slaves hauled the huge stones up using sledges on rollers. But John D. Bush, a designer of machines, says in *Engineering & Science* (Vol. XLI, No. 1) that archaeological evidence for sledges is slight—and there was an easier way. Take a rectangular stone and wrap it with four cradles (see illustrations) and you've got an easily rollable cylinder. Then you simply parbuckle it (as in the lower drawing), a procedure that is 64 times more efficient than using a sledge. The Egyptians, says Mr. Bush, *did* have cradles.

And through some complex calculations involving the weight and height of the stones and the output of human workers, he suggests that fewer than 1,000 haulers armed with parbuckles could



Four cradles turn block into cylinder.



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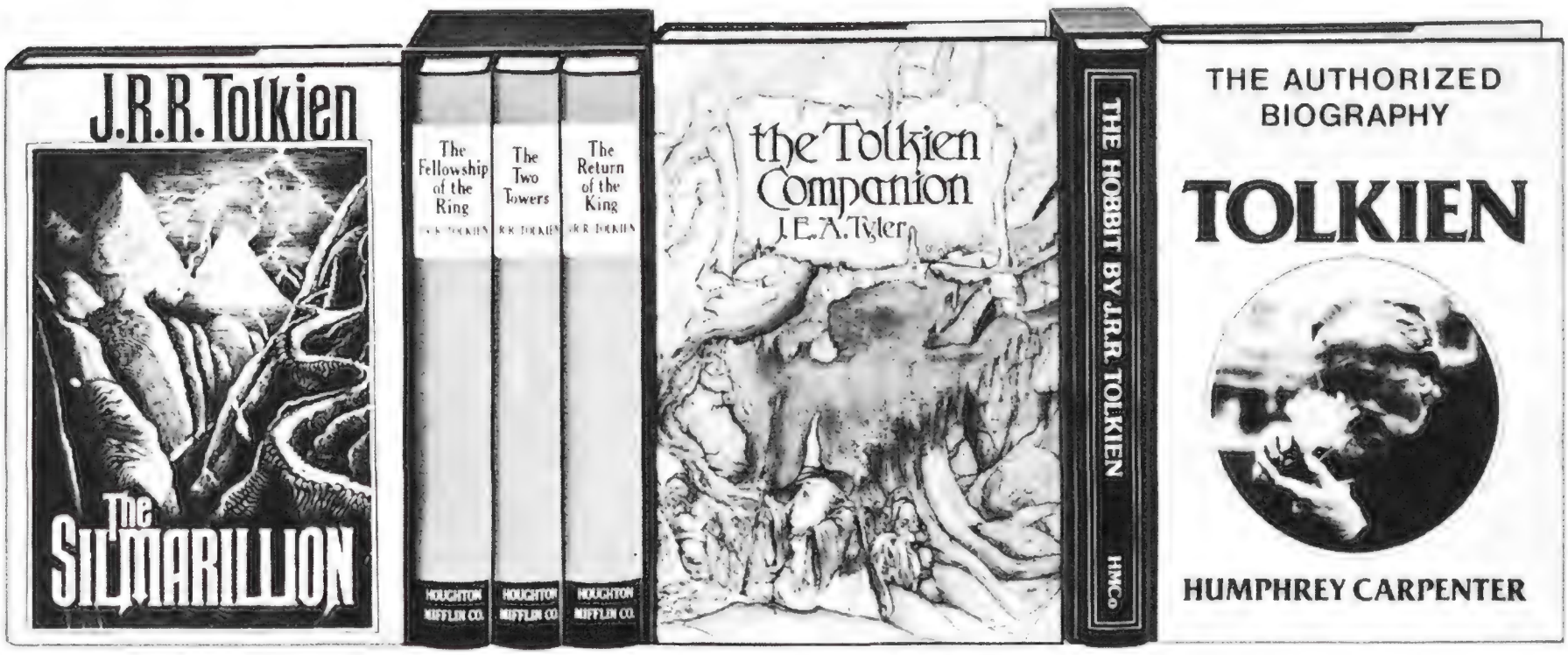

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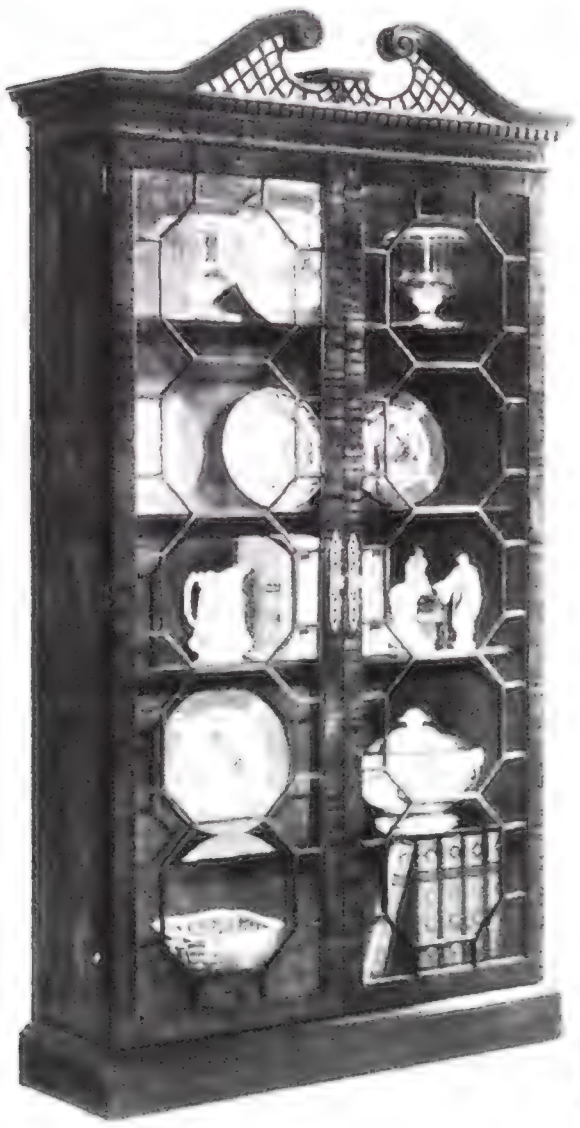

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Better late than never

The star of Bethlehem has intrigued astronomers for centuries and until recently the preferred explanation was a close encounter of Jupiter and Saturn in 7 B.C. (The monks who drew up the calendar in the sixth century blew it; Christ was born before A.D. 1.) But Jupiter and Saturn didn't get close enough to look like one star, it is argued, and now two astronomers from University College, London, and one from the University of Newcastle have a better idea: a nova (that is, an exploding star). And in the history of the Han dynasty they found a record of a new star that shone for 70 days in the spring of the year 5 B.C.

Nothing is sacred

The process of metrification is upon us—to the delight of most people who think about it and to the despair of a handful of curmudgeons. There was a bright ray of relief for the curmudgeons recently when the National Bureau of Standards was overheard announcing that while everything else was to be put into metric terms, one thing would not: a football field would always remain 100 yards. *Some*thing, at least, is too sacred to be fooled around with.

But, alas, the Bureau of Standards has little jurisdiction over intercollegiate sports. *Chemistry* (Vol. 50, No. 9) reports that a chemist at Carleton College in Minnesota suggested that Carleton play its rival, St. Olaf, on a metric gridiron. With the coach's OK, a new field 100 meters long and 50 wide was laid out, 14 feet wider and 28 feet longer than the usual, which put greater emphasis on kicking and passing. And the result? The meddlers at Carleton lost 43-0.

It serves them right, a curmudgeon would say.

Lefties and righties

To the occasional irritation of many left-handed people, most things in life—like scissors and can openers—are made for right-handed people. And that is because most people are right-handed. Why? There are at least two theories. 1) There are some kind of physiological predis-

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positions to handedness that are inheritable. 2) There is social pressure—left-handedness is suppressed.

Now two psychologists from British Columbia have thrown some new data into the pot for those who worry about these things. They analyzed 12,000 works of art showing people (ranging from 15,000 B.C. to A.D. 1950, and drawn from all over the world) to see whether the artist showed his subject using the right or left hand. If the suppression theory were true, they argued, one would expect to see an increase in right-handedness as societies grew more formal and tool use more sophisticated.

Ninety-two percent of all artworks (about the same as the number of right-handed people) showed the subject using the right hand. It turns out, however, that there is virtually no statistically significant variation either over that long period of time or geographically. So, the psychologists concluded, the cause is most likely physiological.

Flea research—a matter of taste

Anyone who lives in a house with two dogs, one cat and six or so teen-age daughters plus, on a fairly regular basis, their admirers, is in obvious danger of attracting fleas. This being a sufficiently common problem to justify research, a series of scientific experiments was initiated—at no cost to the taxpayer—to determine the best defense.

It can be reported that, to the researcher's relief, the flea epidemic could not be attributed to the teen-age girls or their suitors in spite of evidence to the contrary (unmade beds, borrowed clothes, strange heaps of rags called laundry in the basement). These cheerful but potentially pathogenic mammals were isolated from the experiment by being sent to the seashore to visit grandparents, thus leaving only three culprits.

Research therefore proceeded on one aged German shepherd which has traveled from the headwaters to the mouth of the Amazon River on a raft (*Exploring the Amazon*, National Geographic Books); one mop-shaped dog of apparent Hungarian extraction (acquired from a humane society); and one game three-legged cat.

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lasting diminution of the population of fleas and their totally unwarranted attacks upon the experimental animals and the experimenters' ankles.

There is room for desperation in science. A researcher was dispatched to a health food store (of all serendipitous places), someone now lost to science having suggested pennyroyal oil.

"Pennyroyal oil?" said the ghostly pale proprietress. "We're out of pennyroyal oil." Apprised of the nature of the experiment, she handed the researcher a bottle of pills. "Brewers' yeast," she said.

Sixty grains were administered to each of the dogs (30 grains for the cat) daily—in their regular meals—and soon there was no sign of fleas. Five months later the shepherd, the mop, the cat and the rest of the household including your reporter were still free of this scourge.

These astounding results were reported to Dr. Theodore Reed, director of the Smithsonian's National Zoological Park, who said that when, years ago, he was in veterinary practice he employed a kennel boy who was susceptible to fleas ("Some people just taste right") and he solved the problem by giving the boy thiamine (vitamin B_1). Perhaps, Reed opined, brewers' yeast works because it's rich in the vitamin B complex. Maybe vitamin B is all that is required.

Perhaps. But as Ted Reed pointed out, the fleas are not gone from the house. They are waiting in the rug or under the beds for the day when the dogs again taste right, and your faithful researchers are going to take no chances with further experimentation. Brewers' yeast it is.

—JAMES K. PAGE JR.

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Even big people like Omni. For example, the four weekend hackers you see here. All four of their golf bags fit in a covered compartment behind the rear seat. If this were a twosome, that rear seat could be folded down giving 35.8 cubic feet of space. Enough to handle their bags and a couple of carts. Omni's built here in America with American-sized people very much in mind.

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Another thing, with four good-sized suburbanites like you see here, Omni's gritty four-cylinder engine can make this car move with plenty of authority. No sweat at expressway speeds.

Remarkable, when you consider the EPA estimated mileage ratings achieved by that engine and Omni's standard four-speed manual transmission and a 3.3 transaxle ratio:

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38 MPG HIGHWAY/25 MPG CITY.

Now, your mileage may vary according to your car's condition, equipment, and your driving habits. And California mileage is lower. But these are noteworthy ratings for a car that can do all the Omni can do.

Here's a suggestion. Visit your Dodge Dealer. Have him wheel out an Omni. Take it out on the freeway. Over a bumpy road. We have a feeling when you're through, you'll be ready to buy, or lease. Omni's like that. It attracts fans.

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Is this where we're headed? At least 205 Americans have now won damage suits worth a million dollars or more.

In 1962 there was *one;* the next year, *two;* and as recently as 1969, only *three.* But by 1976 the number of million-dollar plus awards ballooned to *43.* The stakes have gone up.[1]

Were these awards justified by real losses and clear fault? Or were they grand prizes in a lucrative game of chance

—America's dis-tort-ed tort law system?[2]

We've reached the point where a person was actually awarded well over a million dollars for "traumatic neurosis" resulting from a false arrest for shoplifting.[3]

If there were no losers in this game, we might dismiss it as harmless fun, like a lottery. But every payer of liability insurance premiums *is* a loser.[4] And indirectly all of us lose, as the soaring costs of settlements and insurance force up the prices of the products and services we use.

Justified claims should be fairly compensated. But it's time to look at state laws that permit excessive and unwarranted awards. California has done so with a citizens' commission created to help bring balance back to the system. We urge other states to follow.

Insurers, lawyers, judges—all of us share some blame for this mess. But it is you, the public, who can best begin to clean it up—by making your views known to your elected representatives. Don't underestimate your own influence. Use it, as we are trying to use ours.

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[1] Jury Verdict Research Inc. of Cleveland, Ohio, keeps records of million-dollar-plus awards. These, however, are only the tip of the iceberg. Extravagant jury-awarded damages set a standard for *out-of-court* settlements—the real problem, since most liability cases *are* settled out of court.

[2] A "tort," strictly speaking, is a wrongful act (other than breach of contract) for which damages may be recovered in court.

[3] In this case, a 23-year-old woman was arrested, tried, and found innocent of shoplifting. In turn, she sued the store and its special policeman. To compensate her for "depression, anxiety, nervousness, phobia, fears, and nightmares," the jury awarded her $1,100,000 in damages. In the past, awards for such intangible damages were reasonably related to actual medical expenses and economic losses. Today, these vague terms are often the basis for huge demands. We have recently seen the filing of a $31-million malpractice suit on the grounds of "mental distress."

[4] Most awards are paid by insurance and any continuing increase in the size or number of awards must be reflected in insurance costs. For example, product liability insurance for manufacturers, and malpractice insurance for physicians, *more than doubled* in one recent 12-month period. While these were averages country-wide, for many the increases were even more severe. In California recommended increases for product liability protection for clothing manufacturers *jumped 400%* in 1976, while malpractice insurance for some physicians *increased 347%*.

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Letters to the Editor

Ice ages may return

Dear Sir: The factors described by Nigel Calder in your January issue certainly had some appreciable effect during the ice ages but, had they been the cause, then Siberia and Alaska would have been covered by massive ice as were Canada, Greenland and Fennoscandia.

No theory of extraterrestrial cause of the ice ages is consistent with the odd distribution of the glaciation. The geological evidence requires a geophysical solution. The prevailing view that we are still in the Glacial Epoch and experiencing another interglacial period isn't necessarily correct.
William W. Blanton
Ramah, Colorado

Dear Sir: The statement that "it takes more energy to freeze water than to melt ice," is a strange kind of physics. I was taught that energy cannot be created or lost, only transformed.
William King
Seal Beach, California
Mr. King is correct. It takes the same amount of energy to freeze water as to melt ice. Ed.

Hail to 14 forgotten chiefs

Dear Sir: I enjoyed your informative article, "Meet the men who were Presidents before Washington," but I think you have made a slight error. Henry Middleton, second "President" of the United States, was not born in London, as you stated, but it is believed that he was born at "The Oaks" near Charleston, South Carolina, in 1717. This, therefore, would make General Arthur St. Clair the only nonnative-born American President.
James H. Edmonson, chairman
Department of History,
Union University
Jackson, Tennessee
Mr. Edmonson is correct. It was his grandson, and namesake, who was born in London. Middleton Place Gardens, near Charleston, is a showplace today. Ed.

Dear Sir: Aside from John Jay and John Hanson, another President was not of English origin. Elias Boudinot was French.
Robert R. Atterbury jr.
Ridgewood, New Jersey
Boudinot's father was French, but his mother, Catherine Williams, was from Antigua in the British West Indies. So, he was really half British. Ed.

Pheena, the finback whale

Dear Sir: I enjoyed reading Matt Herron's splendid article on Pheena, the flying finback whale. It reminded me of a visit to Newfoundland in 1966 when whaling was still legal. A Norwegian company, using Japanese labor, was operating several ships and had a flensing station at Dildo. The day I visited the small outport, one of the ships arrived hauling three magnificent finback whales. Even though this was before the great outcry against the slaughter of whales, the operators of the flensing factory very reluctantly allowed me to take a few photographs (one is shown below).

There is a happy ending to this story. Canada outlawed whaling a few years after my visit. On a return trip, there was a remarkable view—as far as the eye could see in the water there were finback whales, hundreds, maybe thousands, feeding, blowing, surfacing. It was a sight I'll never forget.
Dan Guravich
Greenville, Mississippi

Dear Sir: We were very much interested in Larry Foster's creation of a model finback whale called "Pheena."

We at the Mount Desert Oceanarium offer programs to other museums and to schools with much the same purpose as Foster's—to help people relate to the sea, understand it and protect it.

We have been working now for many months on a project similar to the one discussed in your article, except that our traveling whale will be inflatable. We know that a 60- to 90-foot whale hovering in a school gym will be unforgettable for the children and adults.
David K. Mills
Southwest Harbor, Maine

Dear Sir: You have given a pat on the head to Gordon Williamson, a Scottish fisheries biologist, who had whales impaled on slow-killing harpoons so that he could photograph them in their final struggles. Granted the whales were going to be killed anyway, their deaths need not have included torture. It seems unlikely that anyone knows whether or not the movements of a dying whale are the same as those of a healthy one.
Brian Roberts
Bainbridge Island, Washington

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Pope Clement XI's library

Dear Sir: Michael Olmert's article, "A pope's library is brought to light after 200 years," was marvelous and brought joy to all who, at Catholic University, are interested in that magnificent collection. I think the greatest tribute came from Professor Elizabeth Kennan, who has been deeply involved in promoting a renewed scholarly interest in the Christian Renaissance. She said, "I have worked with the Clementine Collection for a long time, and I could not have equaled the descriptive skill that the author brought to this fine report."

Clarence C. Walton, president
Catholic University
Washington, D.C.

DEAR SIR:
DESPITE DIFFERENCES DEVELOPED
DOWN THE DECADES, DEVOTED
DISCIPLES OF LETTERS DEFTLY
DISTINGUISH D FROM O.

Torrence R. Thomas
Potomac, Maryland

The initial letter is a "D," not an "O."

Automatic music machines

Dear Sir: I first saw machines of the type shown in Rudolph Chelminski's article on Marc Fournier's fabulous collection of automatic music machines at a place in Wisconsin called "The House on the Rock," which is about 90 miles west of Milwaukee, near the small town of Spring Green. The house itself is fascinating, with its 13 rooms draped over an outcropping of rock, but the collection of music machines is even more so.

SOUTH AMERICA BEYOND THE EXPECTED

The unexpected mysteries of ancient civilizations and exotic cultures—right here in the Western Hemisphere.

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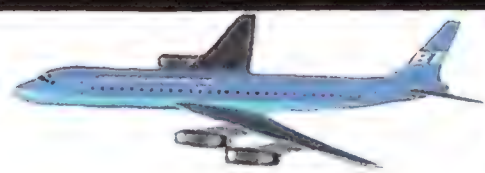
NAME OF MY TRAVEL AGENCY _____

Copacabana, Beach of Rio.

Witches' Market, La Paz, Bolivia.

Candelabra of the Andes, measuring 840 feet and pointing toward the Nazca Plains.



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☐ Send me more information about the Captain John Fripp Villas.

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There are gigantic, automatic organs, violin-playing machines and much more. One machine occupies a complete wall, and an interesting feature of it is a series of bottles partly filled with water that are being struck by mallets. The bottles range in size from one inch to three feet in height.

James G. O'Brien
Milwaukee

Art out of nature

Dear Sir: I have been a subscriber for some time, in large part because of your sensible, compassionate and consistent policies toward tampering with the environment. That is why I was surprised to read Benjamin Forgey's article on Michael Singer and his "Tinkertoys" for people who cannot otherwise appreciate the "moment of magic" in an untouched natural setting.

We need, as Thoreau noted in his *Journal*, to bid "Farewell to those who will talk of nature unnaturally, whose presence is an interruption. . . ."

Richard P. Ames
Mesa, Arizona

Dear Sir: Congratulations on your fantastic spoof of contemporary art. Mr. Forgery (Forgey surely must be a misspelling) is obviously not unacquainted with the contemporary art scene. One does not say "beautiful but inexplicable natural event" without having served a stern apprenticeship at the shrine of Jasper Johns.

The image of this clown Singer tramping about in the treasured swamps of SMITHSONIAN scientists, mashing their tidal shells 'neath his plastic boots is an image from the imagination of a genius. It was a pleasure to read this article, and I hope the *true* author of this precious piece will appear in your magazine in the near future.

Cabot Lyford
Exeter, New Hampshire

Benjamin Forgey, art and architecture critic for the Washington Star, *was not spoofing about the art of Michael Singer, which—like it or not—in the last few years has won critical acclaim here and abroad.* Ed.

Dear Sir: As landscape architects who are very much interested in environmental esthetics, we were delighted to read

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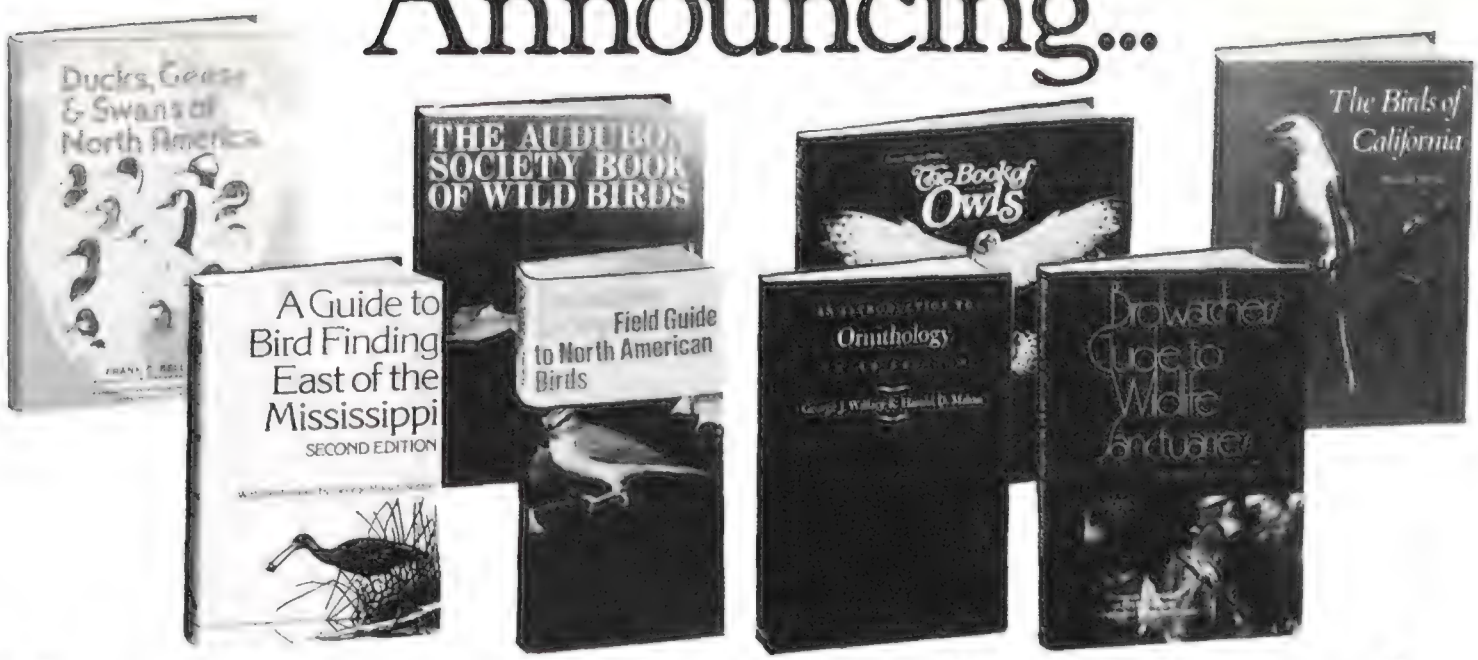
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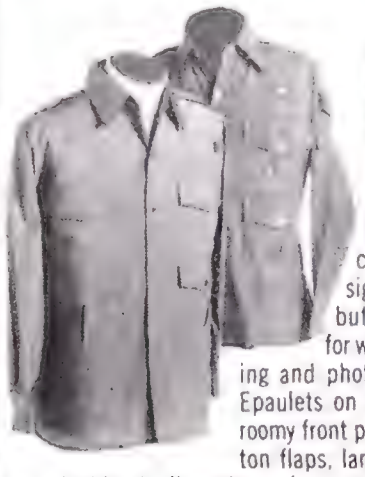

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about Michael Singer's art. We find his out-of-doors creations fascinating.
Charles Tapley
Houston

Frisbees

Dear Sir: Edwards Park's report in "Around the Mall and beyond" reminds me that Frisbees have been around since the first box of "snoose" [probably an Americanization of the Swedish word for snuff—"snus"]. For a youngster, the tin lid to a snoose box was an airborne delight which could—and can—do almost anything a Frisbee can, but on a smaller scale. I still cannot resist taking the lid from a discarded box and sending it into gyration.
J. Chan Ettien
Havre, Montana

Dear Sir: It may come as a surprise to some to know that the Defense Department is funding grants for projects which involve Frisbeelike objects. For example, the Navy has issued a report, "Aerodynamic Analysis of the Self-Suspended Flare," which reviewed actual flight testing and computer simulation; the Army is still testing its XM128 Land Mine Dispenser, nicknamed "Frisbee flinger."
Lee Ratzan
Newark, New Jersey

Alaska

Dear Sir: In your December article on Alaska, I object to the depiction of legislation I have sponsored on this issue as a bill to "set aside only 10 million acres of parks, 8 million acres of refuges, 5.7 million acres of national forests and three wild rivers." Should my bill be enacted, 8 of the 10 largest national parks would be located in Alaska. The acreage in the National Park and National Refuge Systems would be increased by one-third and 25 percent, respectively. Additionally, my bill adds almost six million acres to the National Forest System, more than double that of any other proposal. Consequently, I cannot understand implications by the author that my bill addresses the issue in a niggardly fashion.
Ted Stevens
U.S. Senator
The qualifying word "only" was used to compare the much larger proposals of the administration and others. Ed.

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THE CHRISTIAN SCIENCE MONITOR®

Around the Mall and beyond

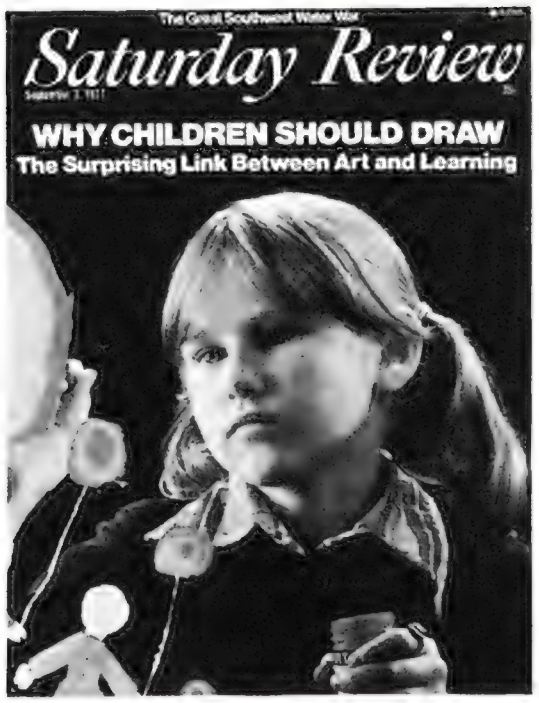
Children are always direct in expressing themselves, which is why their art is often notable. Until March 19 the Renwick Gallery is displaying 13 drawings done by elementary students in Pennsylvania schools. They deal with architecture. The example below is a youngster's idea of a "Kids-Only-Town," one of the architectural concepts that this art illustrates. Other categories at the Renwick are "Energy House," "Snug-A-Bug House," and "Hideaway for Two."

This artwork comes from experimental workshops run by Mrs. Nancy Renfro, a designer herself, who has a lot of faith in children's natural talent in this direction. She got a grant from the National Endowment for the Arts and threw the project open to kids seven to 12 years old who are in architecture and environmental design classes. She gave them no instructions.

The results are wonderfully imaginative and altogether a credit to the Renwick, where they went on exhibit at about the same time as the various works of Frank Lloyd Wright (see last month's Around the Mall).

Another great repository of children's art is at the National Zoo. One of the ways that the Smithsonian celebrated the "The Animal in Art" (Around the Mall, November 1977) was with a series of sketch-ins at the newish administration building at the zoo. Director Ted Reed got some local artists in to give interested people a few hints about how to draw a hippo or a panda or something. The neophyte artists produced some fine paintings and drawings, loose and yet thoughtful; sometimes humorous and always fun to look at.

The exhibit, which was in the entrance hall of this new building, is just over, but children's art is by no means finished at the zoo. Down a corridor from the front entranceway of the administration building is a place called Zoolab, another Smithsonian "hands-on" exhibit something like those special places in the



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• "Why Children Should Draw." For the past decade, the arts have been among the first victims of educational budget cutting. But new evidence indicates that the arts stimulate natural curiosity and—perhaps literally—*expand brain capacity.* Some researchers now say the absence of arts programs can retard brain development in children.

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Natural History Museum (SMITHSONIAN, May 1974 and November 1976). These are exhibits where you can touch the objects and feel the textures for yourself. Here at Zoolab you can feel an animal pelt, a snake skin, the feathers of a bird, the hide of a crocodile. Zoolab is keyed to all ages, so whole families show up here, and often as not, the youngsters tell their parents about what they are seeing. Children always seem to know more about animals than adults. But there may be one or two tricky things that Dad and Mother know better, and here's their chance.

One wall of Zoolab is covered with black-and-white drawings of animals done by young visitors with marker pens. Marlene Robinson, who runs the room, tells me that youngsters take anywhere from five to 15 minutes to knock off a drawing, then go back to the regular delights of the room. The drawings have filled that wall and crept out into the hallway. Marlene keeps them up for a while, then replaces them. There is one sketch of an owl that she is dubious about replacing. It's by someone who signed his picture "Teddy Reed." Since "Teddy Reed" happens to be the zoo's director, Marlene thinks she ought to keep it. Between you and me, it's not all that great.

The Zoolab is fun to visit, but it's busy on weekends and holidays when families come in together. There are three snake skins—pythons, as I remember—and a stuffed armadillo, all a little weary looking from having been handled, since the children are encouraged to use them as subjects for rubbings.

There is a corner designed for children of four or thereabouts where various animals can be sorted out according to whether they wear hair, feathers, scales or just slime. A stuffed frog, in fact, is covered with that incredible product, Slime, to give children a real feel of it.

This grouping, of course, is the basis for taxonomy, so the very young are getting a solid grounding in natural history.

The Zoolab is open for only two or three hours, so many youngsters spend all allowable time there and then go on into the zoo proper with a brochure that helps them apply what they have learned.

Zoolab is open from one to three on weekday afternoons except Mondays. It's open from noon to three on weekends. This delightful new facility would be open longer if it had more volunteers to

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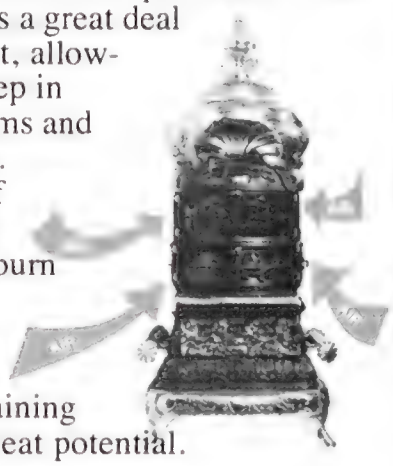
Benjamin Franklin's stove and the other cast iron stoves that followed were an improvement. They limited the amount of air that could reach the flames, so wood lasted longer. And they trapped the heat inside, so that it radiated throughout the room.

But still there were problems. Cast iron expands a great deal when it's hot, allowing air to seep in through seams and feed the fire. And most of these stoves did little to burn the gases that escape burning wood, containing most of its heat potential.



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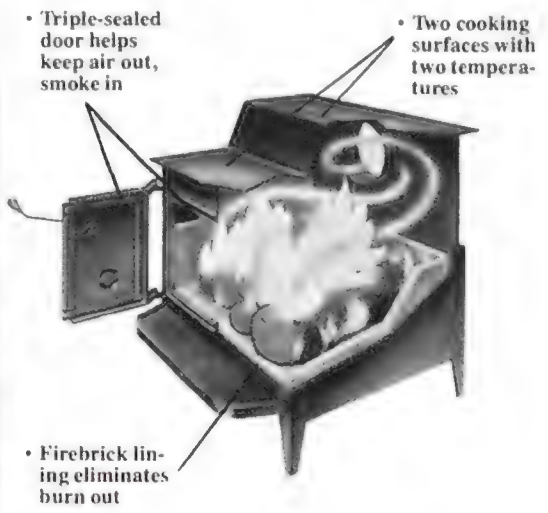
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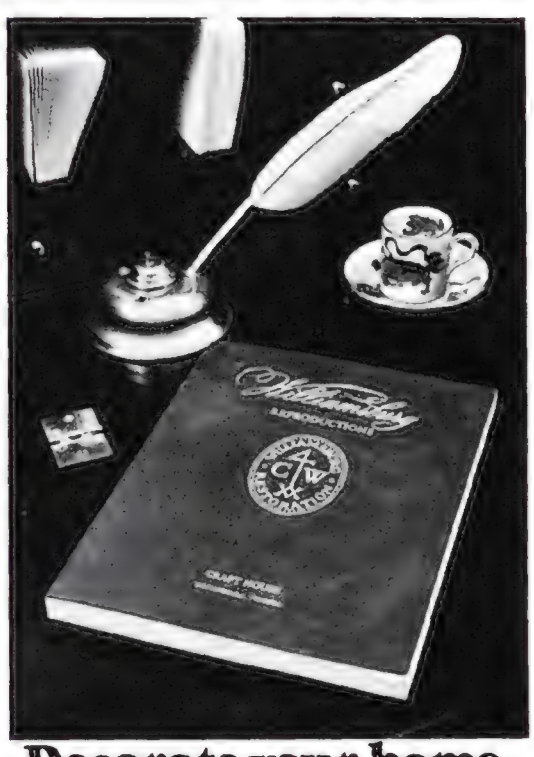

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help out. I toss that out as a recruiting appeal: "Zoolab wants YOU!"

The Museum of History and Technology has been given the year's most amorphous acquisition. It is the studio set for *Meet the Press,* which has been running on weekend TV channels for just about as long as the medium has existed.

I went to the presentation ceremony and found Donald Meaney, a vice president of the National Broadcasting Company, Betty Dukert, producer of *Meet the Press,* Lawrence Spivak, the original moderator, and Bill Monroe, today's moderator, plus a number of Smithsonian people, all sipping sherry and talking about *Meet the Press.* I was the only person wearing a turtleneck. After the sipping and the speeches it became clear that no one really is sure what is being given to the Smithsonian and accepted gratefully by us. There were photographs of a couple of desks. But they weren't on hand. Carpets? No. Microphones? No. Sound effects? Are you kidding?

What did appear, as tangibles, were two panels that served as logos for this hardy TV show. One was the old black-and-white version, about two feet on a side with a little tag saying "NBC" hanging from it. The other was a red splotch with the words *Meet the Press* on it, set on a background of blown-up newspapers. That's the color version used today.

Being an intrepid reporter of the old school, I examined this new plaque with great thoroughness and found that the newspapers stirred many more or less recent memories: Senator Everett M. Dirksen, Secretary of State Dean Rusk, Senator Humphrey, Senator Neuberger. There was reference to the Bay of Pigs landing—tantalizing because you can only read a couple of words and then the red blob gets in the way.

But there is one area where you can read a real puzzler. I quote: "The inspector, George R. King, alleged in a two-page statement that the contractor stuffed two $20 bills in King's pocket in a restaurant parking lot on March 16. This. . . ."

That's all you can read. The 16th of this month, then, is an anniversary, but of what we have no idea.

There were stains on the red splotch and white lettering. "Blood?" I asked Bill Monroe, the new moderator.

"Yes," he replied. And added, "also sweat and tears."

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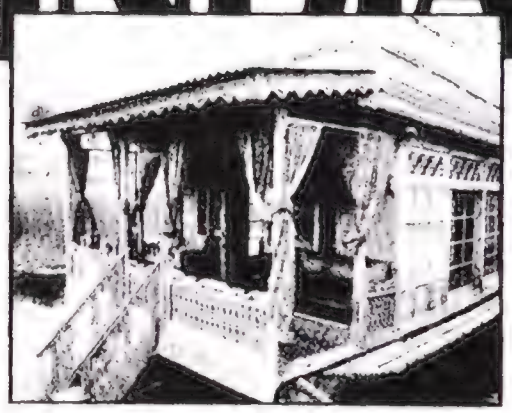

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The complete set, including those logos and that teaser about the 40 bucks, is now part of the News Media exhibit on the third floor of the Museum of History and Technology.

Spivak told me that at one point when he was going into NBC every day, he used to meet Tom Dewey, the urbane, hard-hitting, one-time governor of New York and Presidential candidate, who was doing a politically oriented daily TV show. "Tom," said Spivak, " why are you wearing that formal dark-blue suit? You're already dark-haired and you have a black moustache and a heavy beard—believe me, you don't need the dark suit."

And Governor Dewey said he and his wife had talked it over and decided he needed the dark suit—not the sort of informal gray suit that Spivak was wearing.

And the next day they met, and Tom Dewey was wearing a gray suit and Spivak was looking very uptight in dark blue.

Gloria Steinem, editor of *Ms.*, has become a Fellow of the Woodrow Wilson International Center for Scholars. New scholars are required to present a five-minute thumbnail dissertation about the projects they intend to carry on as Fellows.

I went to Ms. Steinem's presentation, as did between 60 and 70 others, a remarkable total at an event which normally draws perhaps 30, most of them Wilson Scholars. It was a revealing glimpse into the life and times of a new Fellow. Ms. Steinem was preceded by Simon Schwartzman, a Brazilian scientist, who limned his project of modern science in developing societies. He did it very well, although, like most new scholars, he took longer than the allotted five minutes. Then he faced a question-and-answer period that indicated what this whole session is about. It's a sort of intellectual initiation ceremony. It also, of course, spurs the Scholar to think of angles he may have overlooked.

Steinem handled her turn very well. She is an attractive, bright person who suggests that perhaps her subject, "Feminism and its impact on the premises and goals of current political theory," might best be handled as a science-fiction novel.

One of the program's staff people pointed out to me that Steinem is essentially a nice person. "Lots of really famous bright people aren't particularly nice," said my source.

—Edwards Park

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One of the most delightful red wines that we make at The Christian Brothers Napa Valley winery is our California Claret. This is a very dry wine with a pleasing clear red color as its name suggests. And, as with many of our wines, the name has a traditional origin: it derives from the

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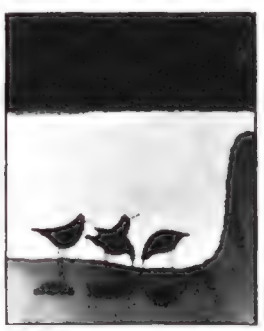

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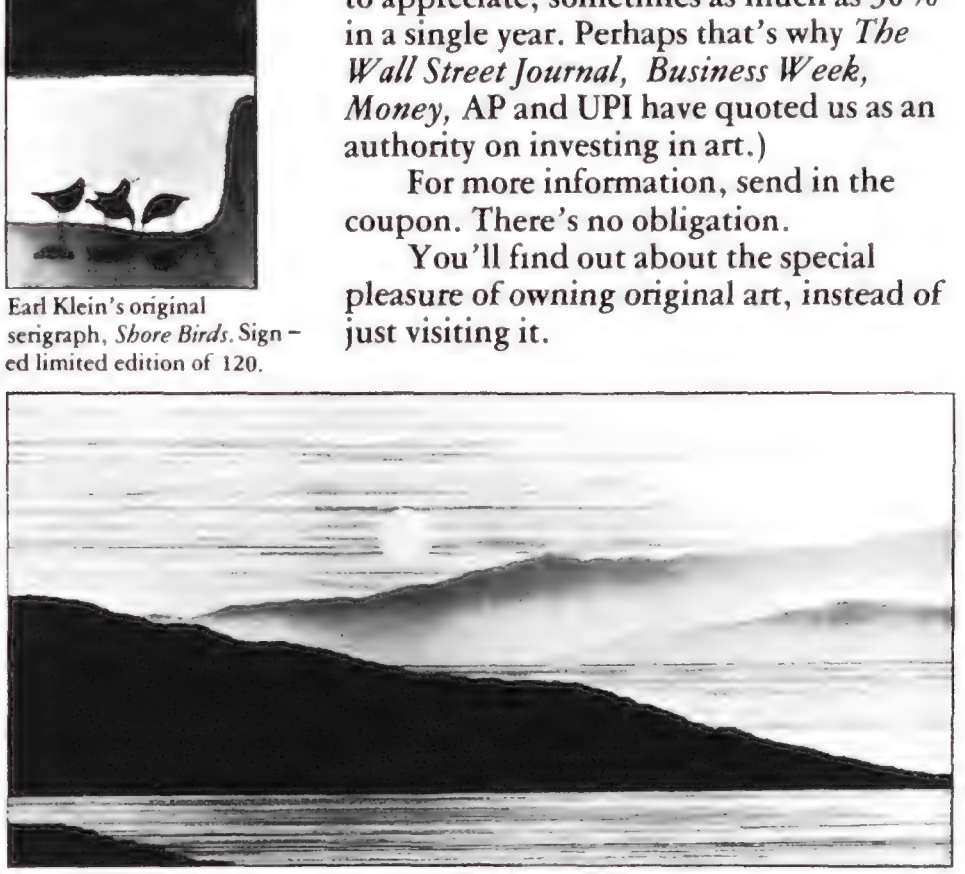

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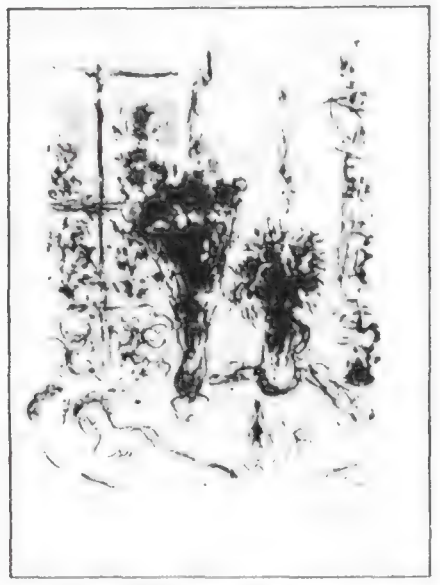

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OPERATION DOUBLE IN THE ROCKIES. (ALMOST.)

In most parts of the country, Operation Double Tree *is* working. Foresters are harvesting twice as much wood from commercial forestland.* And doing it without damaging the environment.

But in the vast areas that border the spine of the Great American West, the forests are not nearly as productive as they should be, given their true potential and the world's growing need for wood and wood fiber.

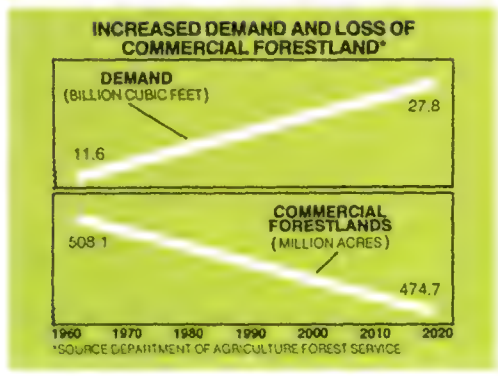
The problem is more one of *perception* than *potential*.

Some people have written the region off as unproductive—period. They see it as a vast wilderness, valued only for its wildlife, recreation and scenic beauty. These things *are* valuable. And large areas have already been set aside as permanent wilderness. But because wilderness areas have no roads, they are inaccessible to all but a few—and almost impossible to protect against wildfire and insects.

Operation Double Tree: Why it's needed and how it works.

In the U.S. alone, the demand for wood and paper products is expected to *double* in less than 50 years.

Yet today, only about one-third of this country's total forest is used to grow repeated crops of timber.



That works out to about one acre of trees for every man, woman and child. And each of those acres will have to be carefully managed to provide a lifetime supply of wood products.

Thus the reason behind Operation Double Tree—the forest industry's name for intensive forest management that can double the amount of wood grown on the nation's productive forestland. And do it in such a way that everyone can share in the multiple benefits of the forest.

The Under-Productive Forest.

The Rocky Mountain States contain 12.3% of U.S. commercial forestland, but they provide only 6.7% of the forest harvest—sort of an Operation Half-Tree, that could well place an unequal strain on other parts of the American forest.

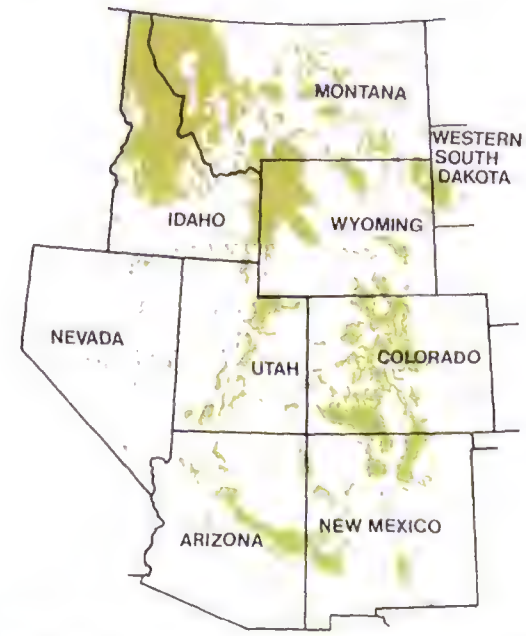
One of the reasons for this low productivity is the stagnated condition of the forests themselves—older trees, past their prime and more susceptible to disease and decay.

More intensive forest management would mean a healthier mix of young,

These forests are only half as productive as they could be.

thriving forests. It would also benefit other forest values, such as wildlife and watersheds. And open the forests so that more people could enjoy them.

Unfortunately, the level of scientific forestry that could make all of these things possible simply hasn't materialized in the Rockies.



The Rocky Mountain States contain 12.3% of U.S. commercial forestland.

Now The Good News.

That's the bad news. The good news is this: What Operation Double Tree is doing in the rest of the country has already begun in the Rockies, on a small scale.

Important first aid for the forests comes from Potlatch Corporation in Idaho, where scientists are working to develop odor-emitting pellets capable of repelling the destructive Douglas fir bark beetle which, if left unchecked, could wipe out a forest the size of Rhode Island in a decade.

These ponderosa pines are shown here 56 percent of actual size. Both are about 75 years old. The smaller one grew in an overcrowded stand and, therefore, received less sunlight and water. The larger pine grew in an area that was thinned to give the best trees room to grow. Management made the difference.

TREE IS WORKING

In Libby, Montana, St. Regis Paper Company helps make nature more productive by working within the natural ecosystem. As the young forests grow, they are thinned out to give the best trees more room to grow. And after the harvest, the land is carefully prepared for the next generation—a new forest of genetically improved seedlings that will grow stronger, faster.

St. Regis raises these seedlings in its own greenhouses and nursery beds at Libby. A similar program has taken root at Bonner and Plains, where Champion International has established its own seedling nurseries.

Operation Double Tree is not just growing more trees, faster, but getting more use out of every tree harvested.

In Wyoming, the Edward Hines Lumber Company is using computers to analyze every log that comes into its mill to determine its best use.

Other companies like Champion, Potlatch, Kaibab, St. Regis and Southwest Forest Industries use virtually all of the wood in each and every tree they harvest. Residues from lumber and plywood manufacture, formerly considered waste, today are ground into wood chips for the paper mills.

A Long Way To Go.

So there is some progress with Operation Double Tree in the Rockies. And even more progress in forests all across the country. But we still have a long way to go.

On the average, industry lands grow 50 percent more wood than the lands owned by government and private individuals. Yet, even here, there's room for improvement.

Overall, the American forest is only half as productive as it could be. And this is a waste of one of our most valuable natural resources. But working together, all timber growers—private owners, industry and government—can learn to make the most productive use of our remaining commercial forests.

Forest management benefits wildlife, too.

Industry has invested millions to make the concept a reality. But money isn't enough.

Leaders and landowners alike must both understand the problem. And, more important, the solution.

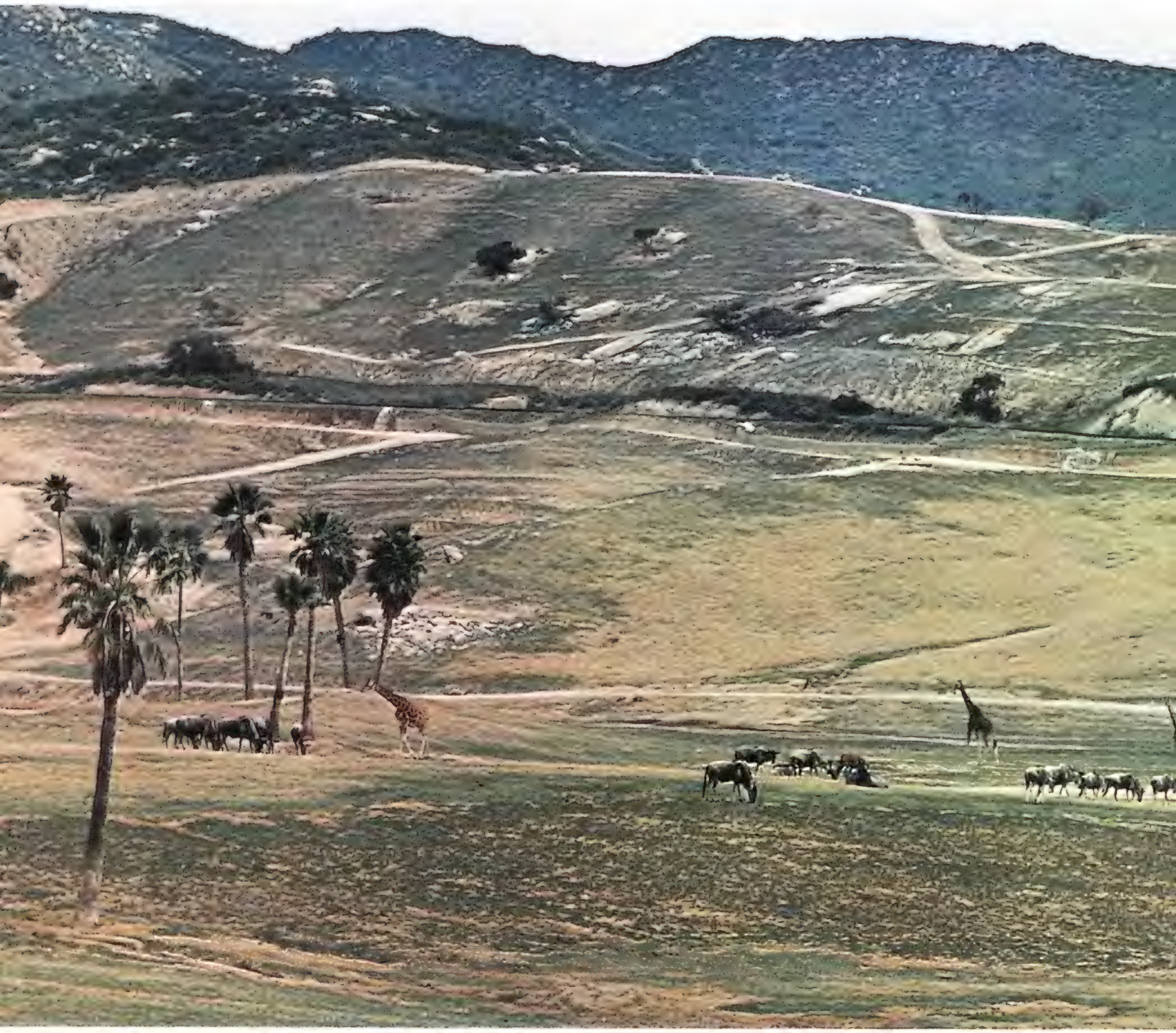
For more information, write for our free booklet, "Managing the Great American Forest," American Forest Institute, P.O. Box 873, Springfield, VA 22150.

**Commercial forest is that portion of the total forest which is capable of, and available for, growing trees for harvest. Parks, wilderness and primitive areas are not included.*

Trees. The Renewable Resource.

By Sheldon Campbell

Noah's Ark in tomorrow's zoo; animals are a-comin', two by two



At the San Diego Wild Animal Park, established in 1972 expressly to breed endangered species, giraffes and white-bearded wildebeests graze in a landscape reminiscent of their native Africa.

By breeding wild creatures in captivity, the collections of the future can save many birds and beasts from extinction

Zoos of one kind or another are among the most ancient of Man's institutions. As long ago as 2500 B.C., Egyptian potentates had zoos or animal farms at which they kept hyenas, monkeys, mongooses, ibex, antelope and other animals. Throughout most of their long history, zoos have been places where animals have been caged or penned so that people could look at them.

These days, though, zoo directors are redefining their purpose. Many zoos are in the process of changing, and they can be expected to change even more in the future. In years to come, zoos will not only be places where animals are exhibited to the public, but repositories where animal species can be saved from extinction through captive breeding.

The most powerful force influencing the future of many animals—and of zoos—is the decline of the wild. Not even zoo directors would argue that zoos are better places for animals than the fields and forests of their native lands, yet zoos, public or private, may be the last chance for some creatures that would otherwise pass quietly into oblivion. The world's population will increase from four billion to seven billion by the early years of the 21st century. Animal species like the Norway rat will prosper, but many animals, caught in the crush, are apt to disappear forever. On every continent except Antarctica forests have been cut to provide building materials and charcoal, or cleared for farms and houses, while the homes of the original inhabitants, from ants to Indians, have been destroyed. As the trees have fallen and new dams have filled valleys with water, unique animals have been left homeless: lemurs on Madagascar, pygmy hippopotamuses in West Africa, tapirs in Central and South America, orangutans in Indonesia and many more.

There is a thin, red line of designated reserves and national parks in which our animals can find sanctuary, but even these havens are sometimes reduced in size—or simply overrun. In the Gir Forest of India, next to a reserve established to save the last Asiatic lions (SMITHSONIAN, July 1973), graze domestic cattle whose owners want the lions destroyed. Similar conflicts are now taking place along the borders of most game reserves in Africa.

In the past, zoos themselves have contributed to the decline of animal populations. Through most of their history zoos were "net users" of animals, taking from the wild more than they gave to the world. New animals were cheap, so cheap that a few unscrupulous zoo managers chose to let some species die each year rather than incur the costs of building larger, more humane exhibits, installing heated quarters or breeding pens,

A trustee of San Diego's Zoological Society, Sheldon Campbell has been closely associated with zoos for 40 years. His book about them, Lifeboat to Ararat, *will be published this fall.*

An adult cheetah keeps watch over a litter of cubs at the San Diego Wild Animal Park.

In another area of park a young giraffe nuzzles an adult. The park's herd

or giving special attention to diets. This exploitation continued until 20 or 30 years ago, when zoo directors began to realize that, on the one hand, animals are complex beings with needs beyond food and water, while on the other hand the wild was disappearing and would not be available for replenishing stocks.

Even then there was ample evidence to indicate that zoos could save animals from extinction. Père David's deer, a splendid creature with broad hooves and a rather long tail, disappeared from the wilds of its native China perhaps 3,000 years ago, but it still survives—in zoos. It is doubtful that many (or any) of the stocky, short-legged Przewalski's horses, the world's only surviving wild horse, still roam the plains of Mongolia, but 200 or more are alive and well—in zoos.

Starting after World War II, some forward-looking zoo administrators began seeing zoos in a new role, in effect as conservation banks, places where endangered species could be held in trust. At the Basel Zoo in Switzerland, Dr. Ernst Lang began 25 years ago to select endangered species specifically for breeding. At the Bronx Zoo (New York Zoological Park), the director, William Conway, formulated an intellectual base for captive breeding and began to reduce the number of species displayed in order to have more breeding groups. The San Diego Zoo's Dr. Charles R. Schroeder energetically pushed the development of the 1,800-acre San Diego Wild Animal Park (pp. 42-45) as a breeding area for larger animals. In East Berlin, Dr. Heinrich Dathe started the Tierpark in 1954 with the idea that it should be a "paradise" for animals—including such rarities as the Asiatic lion. In 1959, animal collector and author Gerald Durrell started his Jersey Zoo (p. 48) on the largest of England's Channel Islands with the intent of breeding smaller, often neglected creatures (SMITHSONIAN, September 1972).

Though there were many difficulties to surmount, these early efforts at captive breeding soon began to pay off. The most spectacular success had to do with an animal called the Arabian oryx, a large, beautifully marked antelope with spectacular spearlike horns. The oryx, which was probably the source of the unicorn legend, has traditionally scrabbled its living from sparse desert plants amid the sand and rock of the Arabian peninsula. Since it was the largest game animal in modern Arabia, a hunting mystique grew up around it. Sheikhs eagerly set out to kill their oryx the way Masai warriors once sought lions. A successful hunt, which meant a dead oryx, was identified with manhood. In the days of horses and muzzle-loaders the animals held their own, but when Jeeps, helicopters and rapid-fire weapons came upon the scene the oryx, never numerous, quickly began to disappear.

Fortunately, anticipating the species' demise, in 1962 the Fauna Preservation Society with the World Wildlife Fund set up a program to capture some of the few animals then left. A thrilling and dangerous hunt produced two males and one female. These, with a second female from the London Zoo, a third female donated by the ruler of Kuwait, and two more pairs from the

of seven giraffes was increased last year when two females were born.

This young white rhino, shown tagging along after an adult, is one of five born in the park in the last year.

King of Saudi Arabia, were placed in the hot, dry Arizona desert at the Phoenix Zoo (p. 46) as a "world herd." On nine animals, essentially, hung the future of an entire species. To make the situation more of a cliff-hanger, the first seven offspring were males.

Later, though, females were born, the herd began to prosper, and, to date, there have been 71 births, enough to have started new herds at the San Diego Wild Animal Park and the Gladys Porter Zoo in Brownsville, Texas (p. 49). The breeding effort came just in the nick of time, because for several years now, no live wild oryx have been reported on the Arabian Peninsula—but within the next year or so they will be seen there again, when animals from the Phoenix herd are returned to a preserve in Jordan.

In the future, as zoos stress captive breeding more and more, zoo administrators and staffs are going to confront problems that they have not traditionally had to face. The foremost problem is simply this: it is often difficult to get animals to mate in captivity. To the public, the problem of breeding wild animals may seem no problem at all. Put male and female together at the right age and soon they will multiply and replenish the Earth. But in fact so little is known about the habits of many species that they have been kept paired in zoos for years without producing offspring.

Copulation must take place at an optimum time in the sexual cycles of both male and female, and sometimes only as one action in a complex set. A male animal may be indifferent to one consort but stimulated by several. He may require ritualized combat with another male before he is aroused, and then he, victorious, may be snubbed by a female who has found another victorious male more attractive. Esoteric diet supplements may be needed to provide what amounts to an aphrodisiac. Or the animals may need exercise, space to perform courtship dances, a place to be alone, or even training in copulatory techniques.

The complexities involved in captive breeding are evident in the case of the golden marmoset, a lovely little Brazilian monkey with a yellow, lionlike mane (SMITHSONIAN, December 1972). Since 1965 scientists have been trying to improve the breeding success of the golden marmosets at the Smithsonian's National Zoological Park in Washington (p. 49). In early attempts at the National Zoo and other institutions, the zoologists found that captive-born parents ignored, abused and sometimes inadvertently killed their offspring. After considerable observation, the scientists learned that the female and male both had to have experience living with and helping to care for younger siblings *before* they themselves became sexually mature—that is, marmosets could successfully rear their young only if they had had early experience in a family situation. But that discovery was only the beginning.

The researchers also learned that if young marmosets are left with their family groups for *too* long—four or five years—they are unlikely to breed. Other research showed that the animals needed special diets if they were to produce offspring. Instead of the carbohydrate-

At the Smithsonian National Zoo's Front Royal breeding center, four or five Grant's zebras

At the Phoenix Zoo about 70 Arabian oryx have been born since the breeding program began.

rich fruit diet they were customarily fed, they required a menu high in protein. In 1977 the National Zoo achieved its greatest success when 17 golden marmosets were born and raised.

At Front Royal, Virginia (above), the National Zoo's Research and Conservation Center, scientists found a quite similar set of problems—and a different solution—in working with the maned wolf, an endangered South American animal that resembles a giant, long-legged fox. Since in captivity maned wolves have generally not cared for their pups, the practice has been to "pull the pups" for hand rearing. But the Front Royal researchers came up with a better answer when they realized that the wolves were extremely shy, and that the mothers needed isolation both from other animals and prying human eyes. (At Front Royal, animals are not displayed to the public, and even scientists try to remain unobtrusive so as to give the animals a sense of being in a wild state.)

The researchers tried an experiment. They used closed-circuit television cameras to monitor the birth of a wolf litter so that there was no human presence to disturb the mother. Feeding was carried out by keepers who ran in and threw down the food, then withdrew quickly. Left alone and undisturbed, the wolf proved to be a good and caring mother.

To carry out such captive breeding programs on a large scale in the future, zoos will have to confront some other problems that have nothing to do with the

are born each year. Other rare animals are being bred and the center will be the subject of a future article.

animals themselves. For one thing, coils of recent legislation directly affect the breeding of endangered animals. Under a convention signed in 1973, one nation after another has established laws designed to prevent the removal of endangered animals from their native countries for any purpose. In order to capture an Indian elephant in the wild for transport to the United States, a zoo now requires permits from both governments and supporting documents the size of a small-town telephone directory.

Red tape also creates difficulties when zoos try to sell endangered animals to one another. Shipments have to be justified and permits obtained to send an endangered species from the Basel Zoo in Switzerland to the Philadelphia Zoo, or for that matter from Philadelphia to Los Angeles. Zoos can avoid the red tape by giving or lending animals to one another, options that they often choose. But if captive breeding is to be successful, they must also be able to sell surplus animals to help pay for their breeding programs.

An additional complication is a host of laws in every country that prevent the importation of diseased animals or animals which may escape, propagate and severely disrupt native ecosystems, as the mongoose has done in Hawaii and goats nearly everywhere. In the United States these laws have recently been beefed up. Traffic in all exotic birds has several times been brought to a virtual standstill because of outbreaks of Newcastle disease, a threat to poultry raisers. And no

At the privately owned Alberta Game Farm, llamas are among several animals being bred in captivity.

The Jersey Zoo in Britain specializes in breeding rare smaller animals like these ring-tailed lemurs.

wild swine—forest hogs, warthogs and others—can be shown in American zoos because the Department of Agriculture has a ban on their importation for fear that they might introduce African swine fever.

Zoo directors are, of course, sympathetic to the aims of such laws protecting endangered species and preventing the spread of disease, as long as the amount of red tape is kept to the necessary minimum, but sometimes it is not. Bureaucratic delay in issuing a simple form by one of three nations involved held up for several weeks the transfer of a male Komodo dragon from Europe to join two females for a breeding program in the United States.

Another obstacle to captive-breeding programs is the feeling on the part of a segment of the public that zoos in general should be abolished. In the minds of many people there remains a stereotype drawn from the dreadful image of the 19th-century menagerie—a barred prison whose inmates spent miserable lives of frustration and boredom. This image is kept alive by the continued existence of roadside and other private zoos where animals live in foul, cramped cages. One antizoo organization's "investigative report," with the alliterative headline "Torment, Torture and Terror Close in on Zoo Animals," states: "It's time to phase out zoos. It's time to liberate zoo animals from exploitation by not replacing those that die. It's the only way to save them from being made abnormal by animal behaviorists whose objective is modification—the alteration of the animal's natural behavior."

In fact, research being done in zoos today is directed toward relieving the conditions most frequently attacked. The effort is to better the lot of captive animals by conquering diseases or by understanding behavior, so that exhibits can be better designed, correct diets used and propagation achieved. Behavior modification has indeed been used—to correct behavior that is unnatural. At the San Diego Wild Animal Park, for example, behavior modification was used to teach a female gorilla the techniques of motherhood.

Perhaps what disturbs zoo directors most about antizoo criticism is that it comes from people who truly care about animals, and whose energy, influence and financial support could help a great deal in captive breeding programs.

Indeed, financial support—or the lack of it—is one of the most serious problems zoo directors face. Some conservationists feel that instead of merely breeding animals in captivity, zoos should devote some of their resources and revenues to restoration of wilderness areas. The fact is, though, that zoos have been hit so hard by inflation that what money there is must be used not for wilderness conservation, but for animal conservation. Food for animals has gone up at the same rate as food for people. Fodder to supply one elephant for a year now costs around $750, up 20 percent from 1973. Meat eaters are even more expensive. Food for one tiger costs $1,650, up 28 percent. Construction costs have soared, making new exhibits two or three times as expensive as they were five years ago.

Despite their concern for endangered species, few conservation organizations have stepped in to support

At the Gladys Porter Zoo in Brownsville, Texas, nine orangutans have been born since 1971.

Behavioral research resulted in the successful breeding of golden marmosets at Smithsonian's National Zoo.

captive-breeding programs. Because their main efforts are primarily directed toward protecting animals in remaining wilderness areas, organizations like the World Wildlife Fund and the National Wildlife Federation are inclined to think of zoos only as a last resort, as in the case of the World Wildlife Fund's helping to save the Arabian oryx. Indeed, an officer of one prominent conservation society once said that he would rather see the California condor extinct than made captive for breeding.

Problems notwithstanding, zoo directors still feel reasonably confident that they can increase and improve captive-breeding programs and, while they are at it, change the image of zoos in general. In the future, zoos are apt to exhibit more animals of fewer species in order to provide the space for captive breeding. Nowadays many zoo directors question the desirability of exhibiting in the old manner several subspecies of the same animal. Because all tigers look very much alike, there is little need today to display side by side the Bengal, Siberian and Sumatran subspecies.

There will be much greater emphasis on research directed toward curing animal ills and understanding animal behavior. Behavioral studies of confined animals will lead to better exhibits for both animals and viewers. Minute changes in an exhibit, when they are based on an animal's biological imperatives, often produce astonishing results. For example, climbing animals like to have places to climb to. Space in a monkey exhibit can be "enlarged" psychologically by putting in screens that enable individuals to isolate themselves from the eyes of cage mates and the bold stares of human primates outside.

Biomedical researchers will concentrate on diseases of exotic animals, many of which are poorly understood. No matter how large the zoo, animals live in concentrations not found in nature. Newborn animals are particularly susceptible to umbilical infections spread by vectors that would normally be dispersed widely in the wild. Viral diseases, spreading rapidly, can literally wipe out a herd or flock.

Zoo designers will deal with a four-faceted problem: each new exhibit will have to allow natural behavior by animals, strike the visitor as meritorious beyond merely showing the animal, be readily accessible for keepers and veterinarians, and be constructed with a sharp eye for cutting costs. Where some of the more elaborate preinflationary exhibits were like stage sets for *Aida*, future exhibits will probably make do with a few scene-setting props in the manner of *Our Town*.

The zoos of the future

Zoos in the future are going to cooperate much more than they have in the past, exchanging information and animals for captive breeding. Already there are more and more "breeding loans" of a single male or female animal, not only to obtain young but to reduce the genetic defects from inbreeding. Zoo directors are beginning to talk of establishing cooperative programs for selected endangered species, particularly those most difficult to breed. Several zoos in a consortium would jointly plan the program, treating individual animals as though they were communally owned and sharing in the results. The program to save the Arabian oryx will provide the model. Trustees of the world herd meet at least once a year to discuss results and reset objectives. Presently those zoos with herds of Przewalski's horses are moving toward a consortium-like arrangement, and zoos in the British Isles are establishing consortia for breeding the great apes.

In the future, major zoos will be trustees for several endangered species. Smaller zoos may breed one or two species, participate in consortia, or simply act as outlets for surplus animals. In fact, a major zoo might supply animals, consultation in exhibiting and veterinary services for small zoos in its geographical area.

Technology will play an ever-increasing role. Because breeding loans involve risks, trauma, adverse reaction to drugs used in capture guns and injury during shipment, many zoo professionals are anxious to see artificial insemination more widely used. Then only sperm need be shipped. So far, research has not solved all the problems. At Cornell University, biologists have been extremely successful in inseminating hawks, but a London Zoo program with an elephant has encountered difficulties. Working with African game authorities, the zoo's biologists have taken sperm from bull elephants immediately after they have been shot in cropping programs and rushed it, deep-frozen, to London to inseminate a captive female—but no pregnancy has yet resulted. Still, artificial insemination should become more dependable in the future and, looking ahead, the San Diego Zoo has already installed a cell bank, a "frozen zoo," where cell and sperm samples from endangered animals can be kept against the day when insemination or cloning might be used to re-create a species all but extinct.

Another technological aid to captive breeding will be the ISIS (International Species Inventory System)

At the Woburn Wild Animal Kingdom in England, 35 species of mammals—including many large African animals like the white rhinos, giraffes and eland shown here—are free to roam about as if in the wild.

center in Minnesota. Sponsored by the Department of the Interior and American Association of Zoological Parks and Aquariums, ISIS will be a computerized inventory, with sexes and bloodlines, of all vertebrate species in most North American zoos and a few in Europe. When the programming is complete, zoo managers will be able to obtain printouts that locate and identify captive animals in all participating zoos.

The objective of many breeding programs is the return of animals to the wilderness, as is planned with the oryx. But the fact is that the zoos are likely to become the final reserves for some species. Few conservationists even dream of returning big predators like lions and tigers to their old haunts. Training such animals to hunt would be difficult and no thanks would come from farmers or herdsmen in areas where the predators were released. Fewer than 300 Siberian tigers are thought to survive now in the wild. More live in zoos, where they are likely to remain.

As a last berth in the ark for many animal species, the zoos of the 21st century will become much more important than they have ever been in the past. Species driven to the brink of extinction will be preserved for generations to come. And perhaps something more than the animals will be saved. As the wild declines, in zoos it may be modeled in miniature—a tropical rain forest, a Galápagos island, a Serengeti plain—bringing to visitors a taste of wilderness, the flavor of a world that used to be. Then the animals, according to their natures—in families, troops, flocks and herds—will become actors creating on an appropriate stage a willing suspension of disbelief, so that harried people can leave civilization behind and in the re-created wilderness be once again primitive Man in a primitive world.

COME SEE THE STATE THAT KEPT THE WORLD'S SECOND OLDEST RIVER FROM DYING OF UNNATURAL CAUSES.

Its name, ironically, is the New River. It is 500 million years old.

Older than the first, tentative fishes. Older than the trees.

And, not long ago, it almost went the way of the dinosaurs.

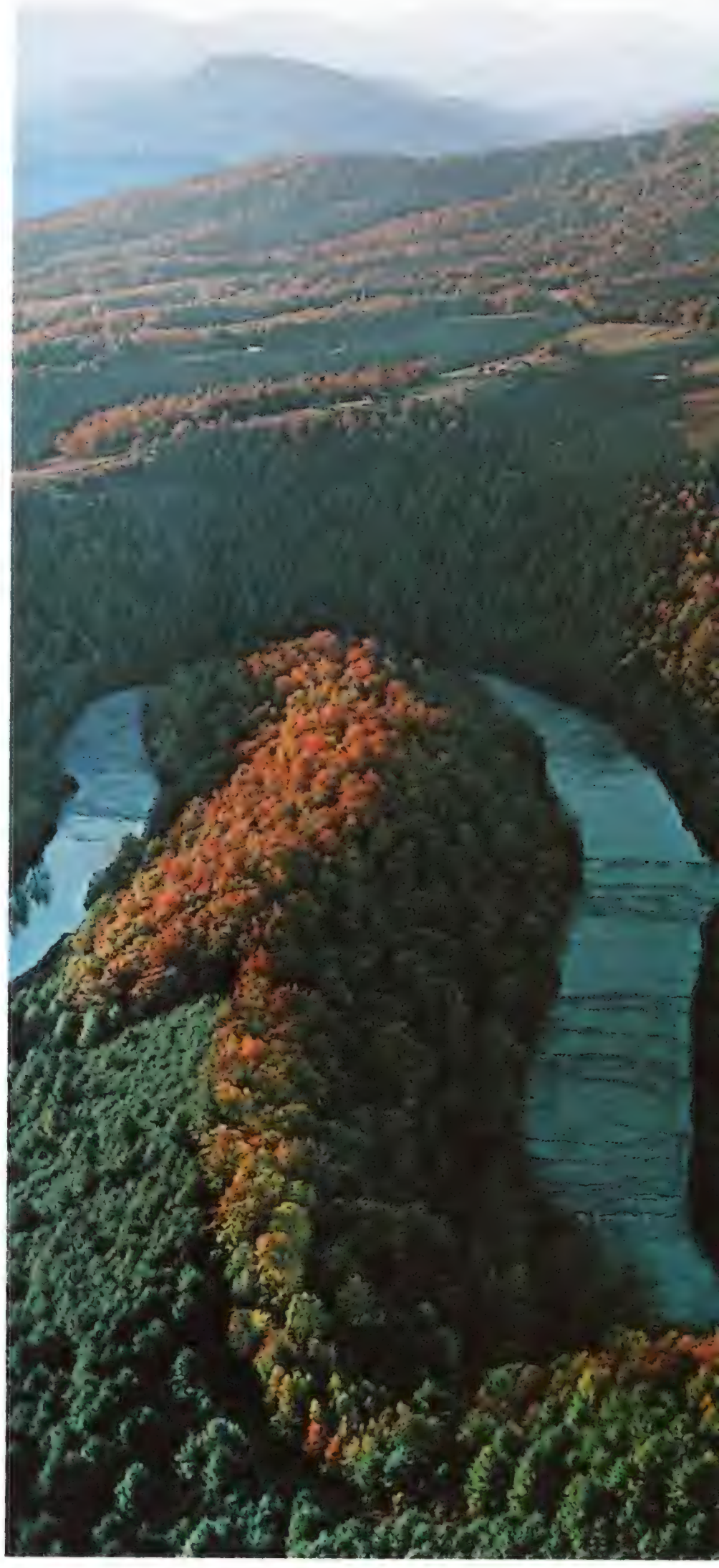
Except for North Carolina, the prehistoric river would be just another man-made lake by now.

But today it flows, unchanged, through gentle hills and fertile valleys. As a part of the National Wild and Scenic Rivers System.

North Carolina, you'll begin to notice from the moment you cross its borders, is a state that takes nature seriously.

You can walk in vast mountain forests that have barely changed since the coming of man.

You can stroll beaches where only the crabs and waterfowl are permitted to take up residence.



From the Great Smokies to the Outer Banks, national and state parks and forestlands cover not just hundreds of square miles, but thousands.

You can camp beside a waterfall, catch your breakfast in a clear mountain stream, and never see a sign of civilization. You can go looking for seashells without having to look at high-rise condominiums. You can run the rapids.

Get soaked to the skin. Go to places you'd never see from the window of a car. Do things you've never done, just because you've never done them.

So come. Enjoy. But do us one favor, please. Try to leave North Carolina the way you found it. Because that's exactly what we're trying to do.

For more information about North Carolina, and a package of free booklets to help you plan your next vacation, write North Carolina Travel, Department 823, Raleigh, North Carolina 27699. **NORTH CAROLINA**

By Kendrick Frazier

UFOs, horoscopes, Bigfoot, psychics and other nonsense

A new group of investigators has taken to the warpath against many claims of paranormal phenomena—at long last

The film *Close Encounters of the Third Kind* may have elevated unidentified flying objects—or UFOs as they are commonly known—to their highest level of popular credibility in years. The movie's producers claim ticket sales will soon reach the 70 million mark—proof of the public's interest in life beyond the stars. But UFOs aren't the only odd phenomena we have been having close encounters with lately.

We've been haunted by a hot-selling book called *The Amityville Horror*, intrigued by the Bermuda Triangle, mystified by tales of ancient astronauts, entertained by the exploits of psychokinetic key benders, assailed by mail-order ads for biorhythm calculators, comforted by tales of out-of-body and post-death experiences, regaled by stories of conversations with plants, unnerved by accounts of Bigfoot, the abominable snowman and the Loch Ness monster, and stupefied by reports of burst appendixes removed by surgeons sans scalpels. Books on these weird subjects sell by the millions over drugstore counters while scientific rebuttals gather dust on library shelves.

In a series called *In Search Of . . .* NBC has broadcast a half-dozen pseudodocumentaries on various ancient and modern mysteries with Leonard Nimoy, the pointy-eared "Dr. Spock" of the *Star Trek* television series, as host. Meanwhile, astrology has enjoyed its greatest renascence since the days of Kepler, and exotic religious cults sweep the land.

"Paranormal" means anything extraordinary—UFOs, the Bermuda Triangle, astrology, telekinesis, yetis and other monsters—not yet experimentally validated.

The more conventional-minded among us are starting to ask what is going on. Why the sudden explosion of interest, even among some otherwise sensible people, in all sorts of paranormal "happenings"? Are we in retreat from the scientific ideals of rationality, dispassionate examination of evidence and sober experiment that have made modern civilization what it is? Has the West lost its unique drive to find the closest approximation of objective truth?

In the past, the raising and answering of such questions has been left to commentators and journalists. Scientists, a notoriously coolheaded fraternity, have fiddled with their test tubes and ignored such imbroglios as beneath their dignity. Generally, nothing so distresses a scientist as getting trapped in a public wrangle over some crackpot idea, especially when that idea is being exploited by the media, is supported only by anecdotal claims and is hard to test or evaluate with statistical methods.

This time around, however, some scientists are beginning to fight back. They have even gone so far as to set up an organization—The Committee for the Scientific Investigation of Claims of the Paranormal, CSICP for short—to investigate unusual phenomena without bias and to help the public distinguish between what evidence is valid and what is invalid, between legitimate questions and manufactured mysteries, between fact and sheer fiction. These scientists like a good tale as much as the next person, and they are often avid science-fiction readers, but they do not want the average citizen to be duped. They oppose the commercial or ideological exploitation of ignorance.

An appeal to reason

During its brief existence the CSICP has begun to show considerable tactical moxie. It has demanded that the media report paranormal claims in a more balanced and less credulous manner. It has filed a formal complaint with the Federal Communications Commission alleging slanted coverage in several NBC-TV presentations, published the second and third issues of its journal *The Skeptical Inquirer* (formerly *The Zetetic*), conducted a news conference exposing some of the more absurd recent cultist claims, sponsored several investigations of its own and established subsections in France, Great Britain and New Zealand. Its expanded membership of 43 now includes Philip Klass, the UFO authority, James Randi, the magician who is an expert on conjurors' tricks, Carl Sagan, the astronomer, biochemist Isaac Asimov, behavorist B. F. Skinner and scholars in a variety of other disciplines

Illustrations by Charles Mendez

such as philosophy, mathematics and psychology.

Getting mixed up in such activities is something one always does at one's own risk. Little did I imagine nearly two years ago when I went to Buffalo as a science journalist to chronicle the committee's founding news conference and symposium that I would now be a member of the group and the editor of its magazine. In that capacity I am the recipient of hundreds of impassioned letters from parafanatics all around the world. It is already clear that the CSICP has a long way to go in combating the peculiar predisposition of most of us, even skeptics, to suspend critical judgment from time to time.

Paul Kurtz, founding chairman of the committee and professor of philosophy at the State University of New York, Buffalo, thinks that the recent tide of anti-scientific and pseudoscientific irrationalism threatens to drown us in sheer nonsense and may ultimately threaten the social climate within which the pursuit of objective knowledge is advanced. "In recent years," says Kurtz, "there seems to have been a tremendous epidemic of paranormal claims. Probably due to the vast social changes that have taken place, many traditional religions have lost their significance for people, who then look to various cults for new meaning. The mainstream of the public doesn't understand scientific proof. . . . An awful lot has been proven wrong that the public is not aware of, or doesn't want to know. There is an abandonment of freedom by people, almost a dictatorship of the cults."

Still, the CSICP believes that even the nuttiest ideas deserve some kind of hearing. According to Asimov, it is not the *subject matter* of the paranormal that is controversial—much of it is provocative and some elements are even amenable to experiment. Science itself deals with the inexplicable all the time. Rather, the debate focuses on uncritical attitudes, the rigor

Astrology was once a mere historical curiosity, but now supposedly sophisticated people accept it.

of evidence-gathering techniques and the quality of analytical judgments.

Take astrology, for example. Kurtz observes that "by the year 1900, it was widely viewed—at least in the Western world—as a mere historical curiosity. Astrology had no coherent theory, it had not been tested empirically, it was contradicted by a whole body of scientific findings. Few intellectuals or educated persons thought it contained any truth at all. It existed only on the fringes of society. Since that time the influence of astrology has been growing, and in the last decade it has made a notable resurgence. Even supposedly sophisticated people claim to believe in it." Indeed, many thousands of horoscopes are plotted every day as true believers try to explain their personalities and daily experiences in terms of zodiacal signs. But it's all a waste.

In the words of committee astronomer and debunker Dennis Rawlins, "After centuries . . . there is still not one repeatable experiment establishing even so much as the bare reality of . . . astrological influences, let alone the fine details." That's not surprising, of course, since the planets, their satellites and the

stars, other than the moon and the sun, are too remote to exert a major gravitational or electromagnetic influence directly on human beings.

Not all scientists dismiss all claims of paranormal phenomena, and some feel that their colleagues can be dogmatic and closed-minded. Theodore Rockwell, a Washington, D.C., engineer interested in anomalous events, thinks the proclamations of the science community occasionally "sound like papal bulls, attempting to prescribe what the public will think, and some scientists act as though they are afraid some of these strange things will be found to be valid."

It must be admitted that there are parascience investigators who try assiduously to produce evidence capable of satisfying long-established scientific criteria. Particularly in extrasensory perception—telepathy, clairvoyance, telekinesis and precognition—a number of investigators have used traditional experimental techniques, and have reached the conclusion that some ESP claims are plausible (SMITHSONIAN, July 1973). While most committee members question these results, their criticism focuses on details of methodology and on fine points of data analysis. Marcello Truzzi, a professor of sociology at Eastern Michigan University, a former member of the committee and a veteran observer of the occult, feels that some parapsychologists have tried to employ scientific methods but believes they still haven't provided sufficient statistical proof of extrasensory events. On the other hand, T. X. Barber, a psychologist who has also been associated with the committee, has concluded that there is some basis for ESP. "Some data are overwhelming," he says, "some are puny, but some stand up very well." What he would like to see is more people examining hard facts collected by the American and the British societies of psychical research. "What is unfortunate is that a judgment is made without looking at the accumulated data." For his part, Truzzi warns against lumping all paranormal fields together, linking "protoscientific" researchers—as he calls those investigating ESP—with those on the other end of the spectrum, the "mystical" occultists, who make claims that cannot be demonstrated empirically.

Some claims, in fact, like those of Uri Geller, the Israeli conjuror, are easy to test. Geller would have us believe he has mastered psychokinetic or telekinetic force—that he can move or shape material objects by the power of his mind. It is alleged, for example, that he can bend rods and keys just by thinking about bending rods and keys.

To give him his day in court, the CSICP sent him a letter in June 1976 requesting that he undergo rigorous testing in a series of experiments to be executed on behalf of the committee. The results were to be published in detail. If Geller could demonstrate proof of any *one* of his five alleged paranormal faculties (spoon twisting, watch starting, key bending, compass deflecting, remote viewing), the committee would be prepared to declare that he possessed powers unknown to science. Geller never responded.

Psychics say they can bend keys with brain power. Magicians can do the same—with legerdemain.

Certainly Geller has not fared well at the hands of the CSICP. When a book called *The Geller Papers* was published in 1976, describing tests he had undergone at "some of the most prestigious government laboratories, research institutes and universities," British psychologist and committee member Christopher Evans responded with a devastating counterattack in the pages of *The Humanist*. Wrote Evans: "One is depressed that anyone could imagine that the hodgepodge of material provided, with its amateurish experimentation, uncritical attitudes and ready, not to say eager, acceptance of paranormal phenomena, could pass as a scientific document of any kind."

No one has been more relentless in attempting to expose Geller's feats as trickery than the magician—and committee member—James Randi. Randi insists that experiments with psychics cannot be valid unless a magician is present to spot deception—something he feels scientists don't expect and to which they are not alert. In *The Magic of Uri Geller* Randi argues that the psychic's supposed paranormal powers can be duplicated by standard magicians' techniques of deception and optical illusion. For example, one of Geller's standard demonstrations is starting a stopped

Kendrick Frazier, former editor of Science News, *has long been fascinated by things wild and weird. He became editor of* The Skeptical Inquirer *in 1977.*

wristwatch simply by holding it in his hands. According to Randi, anyone can perform the same stunt. The lubricant used in a timepiece, when warmed by the heat of one's hands, loses viscosity and frees up the working parts. Indeed, when committee members in New Zealand surveyed six jewelers, they found that out of 106 watches brought in for repairs, 60 of them—57 percent—started working when held in the hands for a few minutes.

Randi and his associate Alexis Vallejo have also gone after France's Jean-Pierre Girard, who last year was hailed by the *National Enquirer* as "the world's greatest psychic," having apparently inherited that mantle from Geller. Randi and Vallejo went to Europe, where they saw filmed demonstrations of Girard "paranormally" bending aluminum alloy bars. In the film, Girard held the bar in one hand while he stroked it with the other. The bar suddenly appeared to bend upward. An industrial metallurgist present said that in his view the bar had indeed bent. But the magicians saw something different. Says Randi: "It was obvious to Mr. Vallejo and me that Girard had bent the bar beforehand, then held it so that it appeared straight, and rotated it 90 degrees to produce the illusion of bending. In a previous film, in close-up detail, we had seen the same rotation made evident from the change in relationship between the thumb and forefinger." The next day Randi and several other investigators met Girard and set up ground rules for another demonstration. All parties agreed to the protocol, but when the test came, Girard was unable to produce any paranormal effects whatsoever over a period of three and a half hours.

Perhaps a major difference between the scientific and non- or prescientific world views is that science is open-ended as a system of thought. It develops and becomes more detailed, rigorous and profound in the

Committee investigators believe that all paranormal phenomena should be rigorously examined and

course of time. The premises and the subject matter of science are in constant flux. Meteors were once considered occult and more than 150 years ago some physiologists believed there was a connection between head shape and personality. According to W. V. Quine, a committeeman and professor of philosophy at Harvard, certain "hypotheses . . . have been abandoned as science developed. One must look for solid evidence, replicable results instead of anomalies."

People without training in science often make assertions for which the evidence is shaky. How does the scientist or sophisticated layman deal with that? His only choice is to stay cool, keep an open mind, examine the evidence dispassionately, and demand that paranormal explanations be more parsimonious than mainstream concepts—that they require fewer assumptions, fewer complex connections of cause and effect.

Nowhere is this skeptical approach more necessary than with UFOs. New sightings are reported so often by the wire services that it's hard to keep up with

tested with established scientific techniques. Here Bigfoot cooperates by taking a "running EKG."

them. Even dedicated cultists admit that many can be explained by a wide variety of natural occurrences or man-made objects. Nevertheless, occasional sightings may be "inexplicable" and these tend to become causes célèbres. A serious and open-minded investigator concentrates only on these "best-case" incidents, and that is what Philip Klass, committee member, has done. Undertaking exhaustive field studies based on his intimate knowledge of aviation and electronics engineering, Klass has lifted the veil from a number of what appeared to be very solid UFO reports. For example, Klass has proved that one oft-quoted sighting amounted to no more than the atmospheric reentry and burn-up of a Soviet rocket booster. In another case, a flaming UFO cutting across the path of an airliner turned out to be a large meteor passing through the air more than 120 miles away. One convincing episode was exposed as a gag perpetrated by a couple of precocious schoolboys, who filled plastic garbage bags with hot air and attached railroad flares with time-delay fuses to them. When the flares went off, innocent groundlings were convinced they had been strafed by a flight of laser-equipped UFOs.

Klass declares flatly, "In 12 years of investigating some of the most famous and highly acclaimed UFO reports, I have yet to find *one* that could not be explained in prosaic terms. . . . There's nothing I'd like better than to say that I'd finally found proof of a genuine UFO. It would be the greatest story in the history of journalism. So I'm not skeptical on principle, just on the evidence."

Biorhythms, another fad of the moment, have a certain basis in fact. It is beyond dispute today that plants and animals, human beings included, are influenced, even governed, in a number of important ways by circadian and other cycles. Some are mediated by sunlight, others perhaps by the moon. Some are internal chemical-feedback loops that regulate body systems. But peddlers of some biorhythm books and calculators have gone a step farther. They claim that precise 23-, 28- and 33-day cycles control physical and intellectual performance and emotion. According to proponents of this idea, these cycles begin on a person's birthday and continue unchanged until death.

A biorhythmic Superbowl

The extent to which this idea has permeated the public consciousness was reflected in the January Superbowl, when a television announcer, asked to predict the winner, produced a sheaf of computer printouts of the players' biorhythmic calendars. Since Roger Staubach of Dallas was playing on an "up" day and Craig Morton of Denver on a "down" day, the announcer picked the Cowboys over the Broncos. In this case, the score proved to be biorhythms 1, skeptics 0.

Nevertheless, William Sims Bainbridge, a sociologist at the University of Washington and a man who sympathizes with what the committee is trying to accomplish, has conducted nine statistical tests of biorhythm theory, including evaluations of Arnold Palmer and 143 other male golfers, 31 women golfers and 95 no-hit, major-league baseball games hurled by 75 different pitchers, and the results were not significantly better than chance expectations.

Well, all right, you say. I never believed in planetary influences anyway, and I've never seen a UFO or had an extrasensory experience. But surely you can't explain away the Bermuda Triangle, that geometrical menace that swallows ships and planes whole without so much as a fourth-dimensional hiccup. Again, unfortunately for the myths, the infamous Triangle appears to be a creature of fiction. Lawrence Kusche, a pilot, university reference librarian and CSICP investigator, has examined every one of the disappearances

in the Bermuda-Florida region and has found none to be extraordinary. Yes, planes and ships do disappear there, but no oftener than in any other heavily frequented area, and in circumstances no more spooky.

One story that gave rise to the legend was the disappearance of the now epochal Flight 19, five Avenger torpedo bombers with 14 men aboard that vanished on a patrol out of Fort Lauderdale in December 1945. The popularity of this tale is amply documented by their brief "appearance" in the film *Close Encounters.* Fiction: the pilots were supposed to be experienced veterans who knew the region well. Reality: one was an instructor; the other four were fliers in training, and all but one of the nine crewmen were students. Fiction: the flight disappeared on a calm, sunny afternoon. Reality: the night was stormy, with high winds and churning seas. Fiction: the instructor was heard over the radio to make strange statements about his aerial environment, as if it looked alien or unearthly. Reality: there were no such statements. Fiction: nothing can explain the loss of Flight 19. Reality: a series of communications errors and other mishaps caused the flight leader to become disoriented. The planes ran out of fuel and all hands were presumably drowned, killed on impact or eaten by sharks.

Kusche has painstakingly detailed more than a hundred so-called Triangle disappearances, some of which actually occurred elsewhere. Many simply happened in the course of severe gales and hurricanes.

Kusche wrote an excellent book on this subject but found it didn't sell as well as the myth. "I assumed that people who read the weird books would naturally want to read the other side of the story to find out the truth—but I was wrong." He claims he is not a debunker out to spoil the fun, but he would like the public to have the facts. "Next time," he says, "I'll kick a bit harder."

Advocates of the paranormal contend that too often scientists just ignore reports that lie outside the usual realms of inquiry. That observation is correct. It stems, however, not from any conviction by scientists that they have a monopoly on absolute truth, but from the nature of science itself. Much of the time the very reason an area of inquiry is considered paranormal is that scientific methodologies are difficult to apply or that the evidence presented fails to convince disinterested observers. There are dozens of patently absurd notions that deserve to be rejected outright—the flat-earth and hollow-earth hypotheses, for example. However, it is not always easy to separate the possible from the outlandish, and scientists cannot be expected to drop promising lines of inquiry to knock down every theory or chase after every report of odd happenings, especially in realms that have been replete with misinformation, skullduggery and fraud.

When a reputable scientist does try to examine some unorthodox idea—like Erich von Däniken's notion that major events in the history of mankind can be explained by the visitation of ancient astronauts, who built or taught us to build monuments like Stonehenge, the pyramids and the Easter Island heads—he often finds it a time-consuming, if not thankless, task. His colleagues think he is neglecting valuable research opportunities or perhaps angling for publicity, and the credulous will not be persuaded. They will go right on believing that we were civilized by beings from outer space, despite the views of critics like astronomer Carl Sagan, who wrote: "I know of no present books so riddled with logical and factual errors as the works of von Däniken."

No one, least of all the CSICP, claims final answers for all the phenomena under contention. The universe is mysterious, though perhaps not quite as mysterious as some want it to be, and our ignorance is like a vast terra incognita still to be illuminated by the beacon of experiment and ratiocination. The goal of science, however, is to approach problems in such a way that answers *can* be obtained, even if they only reveal more unknowns beyond. The members of the committee have made it clear they welcome the cooperation of all who would join in this unending process of honest inquiry.

As Einstein said: "Imagination is good but it must always be . . . controlled by the available facts. There is no distinct philosophical approach which leads directly to truth."

The central thesis of *Chariot of the Gods* is that civilization was brought to benighted Earthlings by brilliant cosmic voyagers. Astronomers disagree.

THE LEAST REMARKABLE THING ABOUT THE NEW RABBIT DIESEL IS 53 MPG H'WAY, 40 MPG CITY.

You've read it right, friends.

According to the EPA estimates the new Rabbit Diesel gets the highest mileage of any car in America. (Of course, mileage may vary depending on how and where you drive, optional equipment, and your car's condition.)

But if by chance you're looking for more, read on. Because the most astonishing news about our economy car isn't the economy. It's the car.

Remarkable thing # 1: eye-opening performance.

Are you the kind of person who gets a thrill out of zipping from 0 to 50 in a mere 11.5 seconds? Well, thanks to an efficient use of aerodynamics and weight, you'll be ecstatic in a Rabbit. In fact, it's already set 10 world records for Diesels.

You'll also be thrilled to know the 1978 Rabbit comes with such things as an "independent stabilizer rear axle" which manages to combine the stable tracking of a rigid rear axle with the smoothness of an independent suspension.

"Negative steering roll radius" which helps maintain directional stability even in the event of a front-tire blowout.

"Front-wheel drive" for better handling, especially in high winds and rotten weather.

Front disc brakes. Radial tires. Rack-and-pinion steering. Breathless cornering.

Do we still sound like an economy car? If so, you're ready for remarkable thing # 2:

More room for people than 40 other cars.

A Volkswagen Rabbit looks smaller than other cars, right?

But inside, our engineers cleverly devoted 87% of the interior to functional room.

Open the trunk and (believe it or not!) there's more luggage space than a Cadillac Seville.

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Then open the door. Your eyes don't deceive you. There's more people space than Chevy Monza, Datsun 510, Pinto Wagon and 37 other cars you could buy.

But wait. While you have the door open, notice remarkable thing # 3; a stroke of sheer genius.

The seat belts actually put themselves on.

No fumbling about on the floor trying to find them.

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It's like magic.

Just close the door and they're on.

This type of passive restraint system will be mandatory in 1984. And only a Model "L" Rabbit has it now.

Another stroke of genius: a cooling fan with brains.

When it's freezing out and a fan isn't needed, our cooling fan knows enough to shut itself off. (That saves you noise and energy.)

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Last but least, a word about money.

Happily, all Rabbits are frugal when it comes to money.

The problem is, which Rabbit should you buy?

A gas-powered Rabbit — which is a wonderful car to begin with.

Or a Rabbit Diesel — which costs about $200 more than our "C" and "L" gas models.

What do you get for $200?

For one thing, diesel fuel costs about 10¢ a gallon less than gasoline.

For another, a diesel engine never needs a major tune-up. Because there are no spark plugs, points, condensers, or carburetors to tune.

All this, and great mileage, too.

A tough choice, to be sure.

But then, a Rabbit is the only car in its class that gives you a choice at all.

What could be more remarkable than that?

VOLKSWAGEN DOES IT AGAIN

*EPA Gas Mileage Guide © VOLKSWAGEN OF AMERICA, INC.

Pushing up through the litter of the forest floor, a cluster of bird's-foot violets struggles for survival.

Flowers mean these particular plants are at least three or four years old; they may live more than ten.

By Robert E. Cook

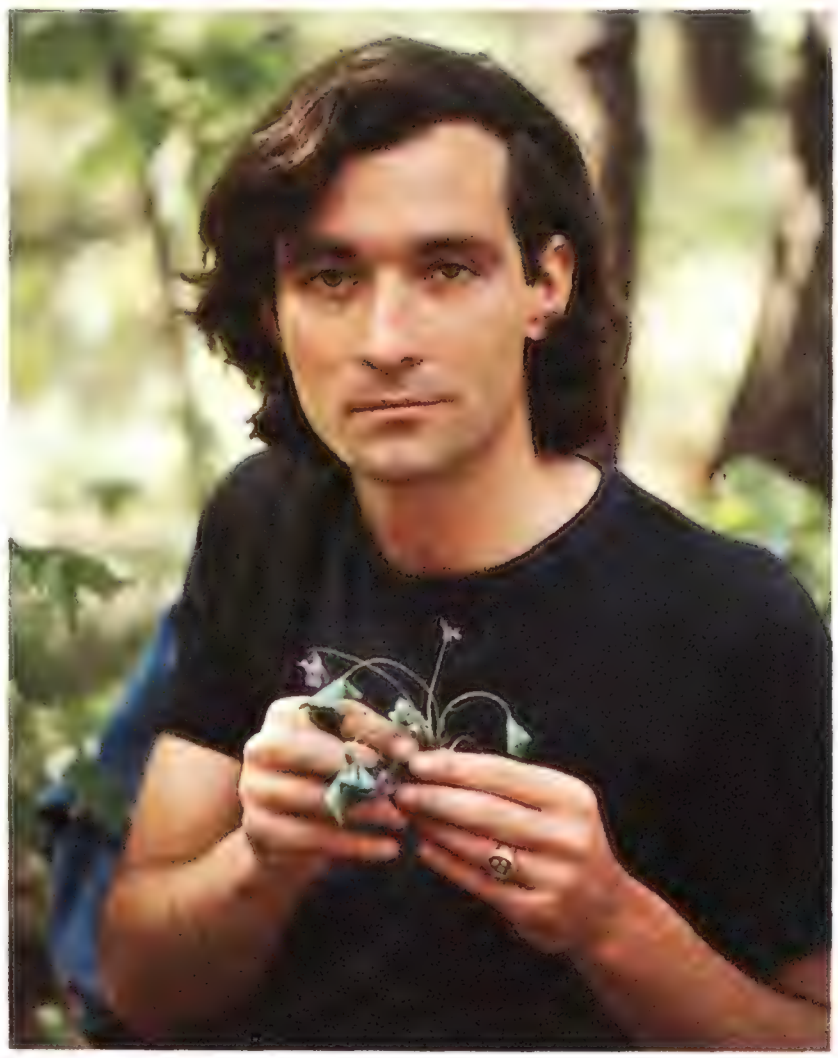
Fragile blossoms of spring aren't shrinking violets

For a student of these tough flowers, a serene woodland in Massachusetts can be as dramatic as the African savannas

A short walk north of Concord, Massachusetts, lies a small patch of swamp and wooded land known to Henry David Thoreau as "Easterbrook country." From Hubbard Hill one can look down in springtime through greening birches to Thoreau Brook where Thoreau's father, John, once cut cedar for pencils. One sees mostly maple in the wetter swamp and meadows, and the hillsides are cloaked with birch and white pine. Thoreau frequently wrote about the sounds and smells of the wildness that still inhabit these woods, although on his long walks he must have seen a very different landscape of meadows and grazing cows. The succession of trees has returned the farm fields to forest, with long runs of broken stone walls and the dead trunks of red cedar to remind one of the recent past. Perhaps more than any of his contemporaries, Thoreau drew his sustenance from the intense contemplation of the common life found around him.

It is easy to think of Thoreau when walking the paths of Estabrook, as this region is called today. This is where I spend most of my spring and summer days, listening to much the same music he heard and watching violets grow and die. My interest in violets is more often intellectual than poetic, a somewhat dry desire to know what life as a plant must be like. Even one with an academic inclination, however, can appreciate the delicate beauty of these modest forest herbs, which are among the first bearers of spring's warmth.

The violets most often seen flowering in spring are members of a large family of plants, the Violaceae, with upwards of 900 species of trees, herbs and shrubs widely distributed throughout temperate areas of the world. Most of these are in the genus *Viola* and about 75 species are found north of Mexico. There are two general forms of violets, stemmed and stemless. All of the species that interest me are of the latter type, with the leaves and flowers arising directly from the crown of the rootstock, forming a clustered rosette of foliage. As one might suspect, stemmed violets produce leaves from an extended upright stem; the cultivated pansy, *Viola tricolor*, is an example. Though many do not know it, violets produce two varieties of flowers. The blossoms of spring are familiar to most everyone who has walked meadows or woodlands, and are available in yellows, whites and manifold shades of blue, including purple and lavender. Throughout summer, though, most species will also produce small, inconspicuous flowers that never open or are visited by any insect pollinators. They resemble buds of flowers, with rudimentary petals and greatly reduced parts, and they are invariably self-fertilizing. Such cleistogamous flowers, as they are called, produce a great abundance of seed, far more than the colored forms. They have dispensed with the business of pollinators and have become self-reliant.



The author, 31, is an assistant professor of biology at Harvard University, where he teaches plant ecology.

Photographs by Marvin E. Newman

Violets: a special charm in spring

In quiet triumph over adversity, the bud of a northern downy violet begins to become a flower.

When the first spearheads of skunk cabbage push through Estabrook's snow, I begin my search for violets. I am by inclination an ecologist, a poser of questions about nature, who at present contemplates the population biology of plants, their abundance and distribution. I try to understand why one species can grow and reproduce very well in one habitat and not another, and why there are two or three plants in a patch rather than 20. So I've chosen populations of violets for close scrutiny, much as one might track a pride of lions in the East African savanna to know and understand their lives.

It is individual plants that live or expire; so each spring I count new recruits to my populations, see which have come through winter alive and which have died. I watch the growth of new leaves through summer and the development of fruits and flowers. It is very much a study of plant behavior, for I soon begin to see what the life of a violet is like and why different species survive where they do.

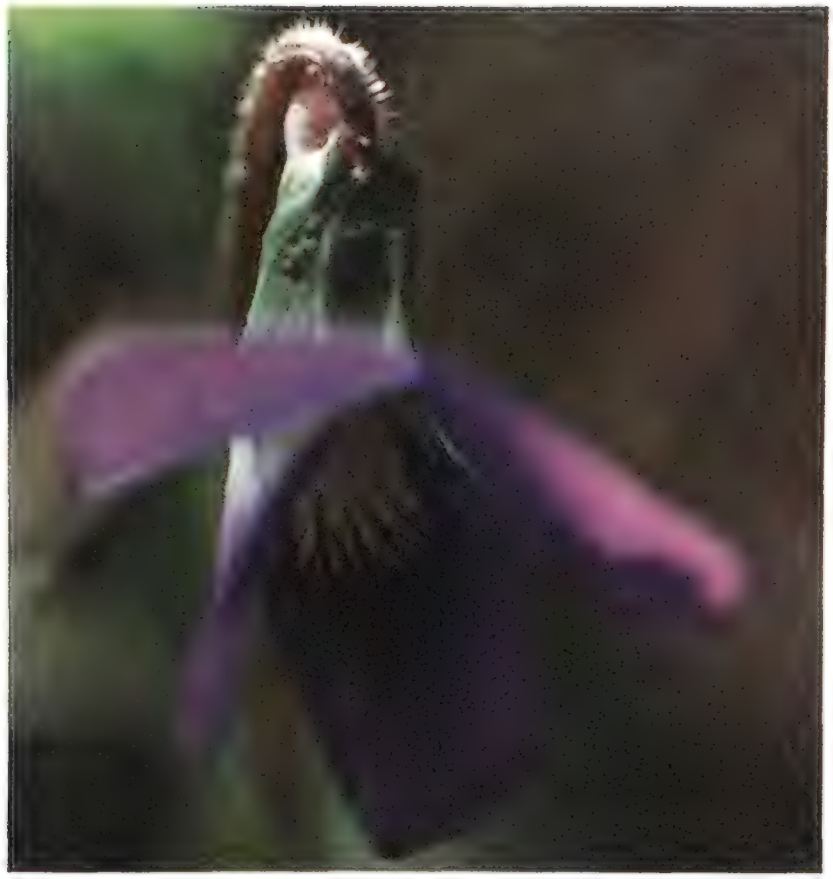
In spring it is, quite naturally, the vivid blueness of violets that the hiker first glimpses against the brown litter of the forest floor. As Thoreau noted in his *Journal* on May 9, 1852: "The *Viola ovata* is one of the minutest of spring flowers—two leaves and a blossom-bud showing the blue close to the earth. What haste to push up and open its lesser azure to the greater above! Such a disproportion of blossom to the leaves. Almost literally a pretty delicate blue flower bursting forth from the scurf of the earth."

I have been watching a closely related species, *Viola sororia*, the woolly blue violet (see cover), which can most often be found growing in scattered clumps on the drier slopes of open woodlands. Each season *V. sororia* adds a short increment to its stout rhizome—really just an underground stem—through the growth of a rosette of ovate leaves.

As in all violets, the deep blue flowers of this species develop from the axils of the very earliest leaves, usually one or two being produced from any individual stem. They are pollinated by small insects such as gnats and flies during May, and the capsulelike fruits mature in early June.

The second species I've become familiar with is found in thick mats of moss along the edges of swamps and meadows. *Viola blanda*, the sweet white violet, is quite different from its blue-flowered relative. It prefers moister beds than the woolly blue; and in spring it can be found in the standing water of surface depressions or, later, beneath the shade of ferns and sarsaparilla where the soil remains damp through summer. The flowers are white with the lower petals veined purple and characteristically bearded with fine hairs. In addition to reproducing by fruits and seeds, white-flowered violets will also produce long runners or stolons from the axils of midsummer leaves. These grow beneath the leaf litter and generate one or more plants some distance from the mother.

A third species, *Viola fimbriatula*, has been called the northern downy violet (above, right) and it, too, develops rich flowers in early spring. Unlike the previous two, however, it prefers the much sunnier and drier soils of abandoned pastures and open hillsides. The individuals of this violet population that I have been observing have sprung up in the very disturbed soil created by the uprooting of several large white



The bud opens further, and the petals begin to fold backward. Soon the pistil and stamens will be exposed.

Fully open, the flower displays heavy "beards" on the lateral petals. Flowering is unusual before fourth year.

pine trees in the woods of Estabrook. They are thriving in this patch of fresh earth surrounded by the litter of birch and ash. The leaves of *Viola fimbriatula* are considerably longer than wide, growing from a stout vertical rhizome in the sandy soil.

The most unusual violet, and the species that Thoreau preferred above the others, is *Viola pedata*, the bird's-foot violet (p. 64). On May 17, 1853, on a walk south of Concord, he noted: "The *V. pedata* there presents the greatest array of blue of any flower as yet. The flowers are so raised above their leaves, and so close together, that they make a more indelible impression of blue on the eye; it is almost dazzling. I blink as I look at them, they seem to reflect the blue rays so forcibly, with a slight tinge of lilac."

The bird's-foot violet displays a distinguished foliage; its leaves are deeply dissected, forming fingerlike leaflets growing from a thick rhizome. The flower is unique as well with the pollen-producing stamens exhibited prominently in the center of its blue petals like an orange eye. Such flowers may sometimes be found blooming in the shorter days of fall, although I have seen them only in middle May.

These brief sketches of a few species are portraits of rare victors, those fit individuals which have endured the trial of ordinary survival to maturity. From the human perspective, the life of the typical violet seems a strenuous and exceptionally risky affair, doomed in all probability to failure. It begins, of course, in the

Tagged by the author, northern downys grow on disturbed ground in the woods where tree blew down.

protective nurture of the mother plant when a male pollen grain penetrates an ovule and the growing embryo begins to command a share of maternal provisions. To facilitate this offspring's passage to autonomy, a dormant seed is formed, a rudimentary plant encased in a hard shell and uniquely free from want of water, light or mineral soil. (A careful gardener can grow wild violets from seed.) Upon ripening it is dispatched into the litter to lie for a winter or two, or even for many years.

If spring should bring the proper conjunction of moisture and light, germination will commence and the embryo will penetrate the casing with its root and two leaflike cotyledons. It is at this moment that the risk of mortality rises. The seedling strives to find a pocket of moisture in the soil in order to survive the withering sunlight or the attack of a mold. Many die during these first few weeks, and only with the unfolding of the first new leaf or two has the seedling established a grip on existence.

During the first season of growth most young violets produce only two or three small leaves and certainly no flowers. Little light reaches the forest floor through most of the summer, and the rapacious growth of trees and ferns soon drains the spring water from the soil. As the June temperatures rise, brooks slow to a trickle, the surface inch of litter dries and the leaves of small violets begin to droop and wilt. A string of cloudless, sunny days proves fatal to many seedlings, and each summer a ten-day spell without rain has invariably taken a heavy toll of first-year plants. Even if they are large enough to escape these conditions of desiccation, the later days of July bring a siege of insect larvae and slugs which find tender violet shoots a great delicacy. Most violets die very young. A few manage to find a protected pocket of moister soil and to escape the grazing of predators. In early September the nutrients in stems and leaves begin to move to the roots and rhizome, turning foliage yellow, and the plant starts to form a dormant terminal bud which survives the winter. Even this is hardly secure, and some plants will fail to reappear the next spring.

Next month, I will return to Estabrook as the first violet flowers expand through the litter. It is always exciting to see which of the survivors of the preceding summer will now enter their second year of life. Like many early herbs, violets are primed to capture that pulse of bright sunlight reaching the forest floor between the first spring thaw and the closing of the foliage canopy in late May. Growth is very rapid at this time, with previously formed leaves in the winter bud expanding out into the abundant sunshine. Even plants that have persisted this long are hardly free from the threat of death. To a young violet a falling branch or the hoof of a deer may bring instant obliteration; more often the competitive strain of a nearby fern or a clump of swamp sedges leads to a slow wasting decay, perhaps terminated by a rich growth of mold. Throughout this second year a few exceptional individuals may produce five or six strong leaves, but usually no flowers. Only in the third year of life have I seen the first fruits produced, and these are usually the cleistogamous variety. One must often wait until the spring of the fourth year for any flourish of showy flowers. Then each subsequent season will see a new vernal bloom followed by a succession of self-pollinated flowers through summer. How long the very oldest violets will live is unclear, but I do not think ten years is exceptional for very large individuals.

The durable vigor of a seed

Perhaps the most interesting violets I have been following are *Viola fimbriatula*, the open-field species that germinated in the middle of the woods in the raw soil created by a tree blowdown. Throughout Estabrook woods there are many decaying trunks of trees lying horizontal beneath a blanket of lichens and moss. Three years ago I discovered one such blowdown on wooded land not far from the mill brook where John Thoreau's pencil factory is believed to have once stood. In the pit had germinated the seeds of a number of weedy species seldom found in the forest, such as Indian tobacco, pokeweed and 46 individuals of *Viola fimbriatula* (p. 67). I became convinced that the seeds of all of these plants had been living in the soil for many years, probably since the tree was a sapling in a pasture, and I estimated its age to have been more than 50 when it was uprooted. It was intriguing to realize that these violets had begun the plant phase of their lives when very old, and I was reminded of the botanical aphorism that a plant is

A bird's-foot violet plant flowers at center. This is a one-color variety of the sort seen in New England. From top left clockwise are winter rosette; the fruits and seed capsules; a whole plant in the fruiting stage; and a bicolor variety found mostly in West and South. Thoreau called bird's-foot "handsomest" of all.

only a seed's way of making another seed. The land upon which I had discovered this fugitive population of field violets had once been treeless, a pasture grazed by sheep or cows; nearby were still several broken cedar posts with rusted scraps of barbed wire. Violets and other pasture weeds would have been abundant then, flowering through summer, and dropping many seeds into the soil. As birches and pines invaded the abandoned field and turned it to young woodland, the violets would have been shaded out. But seed apparently remained alive in the soil, waiting for a patch of disturbance to bring them to active growth. My population of *Viola fimbriatula* was a testament to the former history of the land.

To Thoreau, the quiet contemplation of wildness became a passage for self-exploration. "It is the marriage of the soul with Nature," he once wrote, "that makes the intellect fruitful, and gives birth to imagination." Throughout his long walks he found in the stillness and solitude of his surroundings a metaphor for his own soul. He spoke of a vase of flowers in *A Week on the Concord and Merrimack Rivers* and composed a verse that begins:

I am a parcel of vain strivings tied
By a chance bond together,
Dangling this way and that, their links
Were made so loose and wide
Methinks,
For milder weather.
A bunch of violets without their roots,
And sorrel intermixed,
Encircled by a wisp of straw
Once collected about their shoots,
The law
By which I'm fixed.

As a scientist I, too, explore nature, but bring to the watching of violets metaphors that spring from a self-reflecting intellect, a set of abstract meditations about the meaning of their lives that mirrors my own struggles to cope in an unpredictably complex world. There is a calm simplicity in knowing how they survive and why. *Viola sororia*, the woolly blue, grows best in dry woodland litter where its stocky rhizome allows it to weather both drought and long winters. *Viola fimbriatula* is the colonizer of fresh soil, a fugitive waiting as dormant seed in the soil for a forest clearing. *Viola blanda*, a white-flowered species, is a denizen of the lusher woodland brooks and meadows. *Viola pedata* (opposite) remains a stranger to me. This violet—"how much expression there is in [it]!" exclaimed Thoreau—is rare in Estabrook, only a patch or two to be found in sandy soil, and these may be gone before long.

Even to the eye of the professional naturalist, the woods bring a special nourishment to the spirit. One thinks of a clutch of Indian pipes, white and waxy, pushing through pine litter, or the reassuring caw of a crow across the still surface of a pond. I particularly remember one day in June when I sat on a rotting log and a majestic pileated woodpecker swooped through the birches and grappled the trunk of a large white pine not far above my head. Reflections such as these stand strong during the colder days of winter; they give soul to a science made stark with the words of learning and they bring to each season a feeling of returning discovery. It is easier to endure the ice and snow knowing I will soon visit Estabrook to see some old friends again.

This is the pale fruiting stage of the woolly blue violet. Within the fruit, about 40 small seeds form.

The pistil of a bird's-foot violet, nearly enclosed by stamens lying flat against it, awaits a pollinator.

Gulf

Adrian Mills controls a six-million-ton fleet of supertankers.

Adrian Mills is a Tanker Program Analyst for Gulf Oil. Which means that when the

Adrian does whatever it takes to get the oil transported from where it is to where it's needed.

captain of any of twenty-one supertankers working for Gulf needs to know where to pick up a cargo of oil, how to get there, and when and where to deliver it, Adrian gives the orders.

Whatever it takes

Adrian does whatever it takes to get the oil transported from where it is to where it's needed. Sometimes she has to charter a tanker. Other times she may trade the use of one of Gulf's ships to another oil company, to gain the use of the other company's ship if it happens to be right where she needs it. (In her work, that's called tonnage exchange.)

Monsoons and straits

Adrian routinely worries about things most people never think of: the draft restrictions in the Malacca Straits; the monsoon season in the Arabian Sea; or whether there's enough storage space in the tank farm at Bonaire, Netherlands Antilles, for one more shipload of oil.

It's no glamour job; Adrian is a true professional: some days her Pittsburgh office is as busy as a war room.

Adrian Mills. One of 52,000 Gulf people, meeting the challenge.

Gulf

Gulf people: meeting the challenge.

Gulf Oil Corporation

This is one of the 21 ships Adrian is in charge of: the 228,000-ton *Afran Zodiac*.

When any supertanker captain needs to know where to pick up a cargo of Gulf oil, Adrian gives the orders.

Skylab photos of sun taken in extreme ultraviolet wavelengths show solar activity difficult to see from Earth: here, ionized helium filament arches from the surface, then twists back—a trip of 367,000 miles.

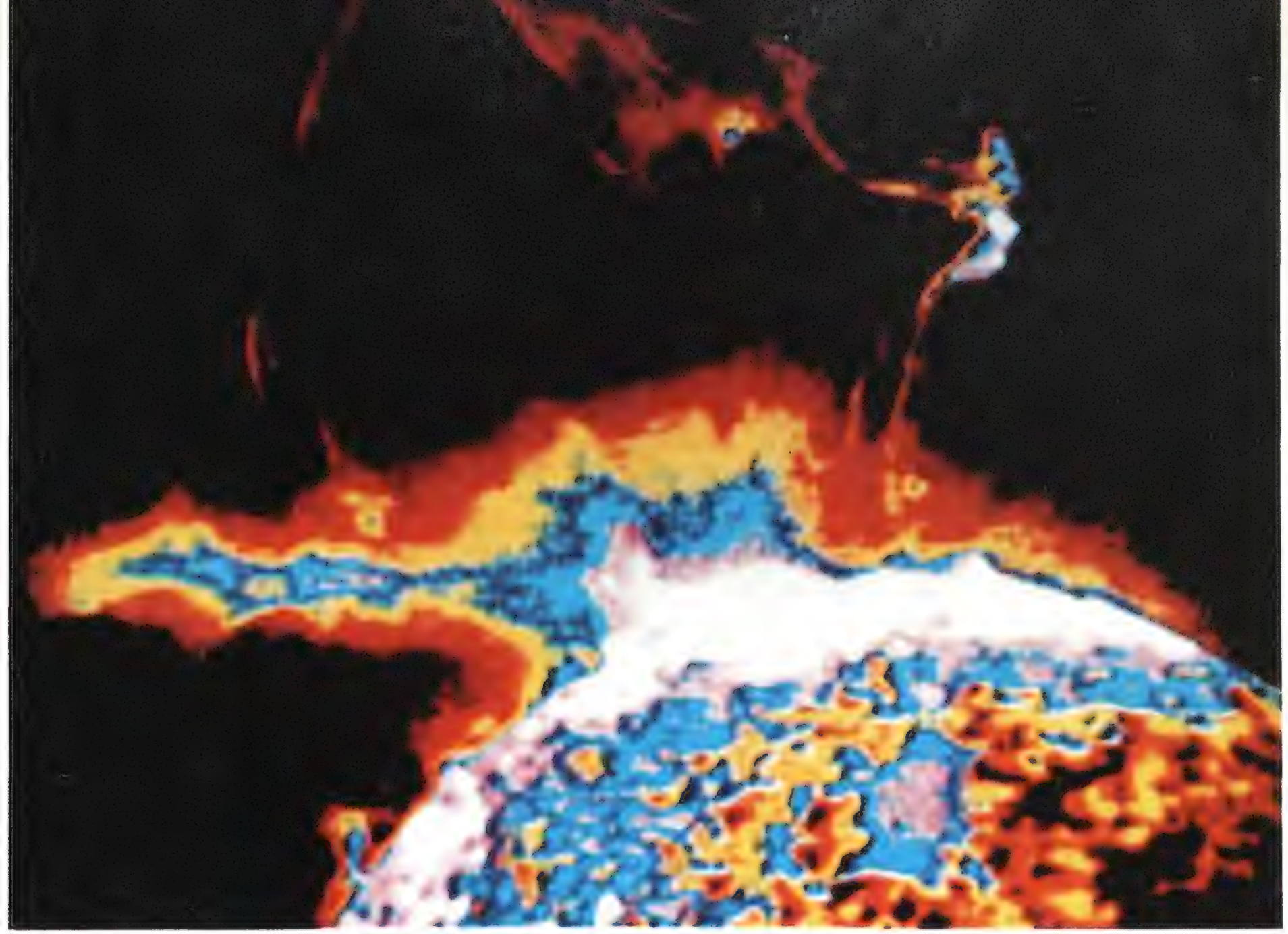
By James S. Trefil

Missing particles cast doubt on our solar theories

We can't find enough of the byproducts of the sun's nuclear fire called neutrinos—so it's back to the old drawing board

The author of *Ecclesiastes* may have been right when he said there is no new thing under the sun, but during recent years scientists have learned that there may be something new, at least to us, going on inside the sun. The story has all of the elements of a classical scientific mystery. First, experimenters find a totally unexpected result. After an initial period of disbelief, other scientists try to come up with explanations. As time goes by, the explanations become more and more bizarre until the whole thing looks very confused. In the classical story, of course, someone comes on stage at this point with the correct answer and everything is resolved beautifully. In our story, the person hasn't yet come on the scene, so all we'll be able to do is report on the confusion.

In a sense our story begins when the first men looked in awe at the sun. They improvised stories to explain the regular rising and setting of the sun, often thinking of the sun as a flaming chariot being drawn across the sky. Later, with the invention of the telescope, men discovered that the surface of the sun is a turbulent place, with storms and eruptions spouting thou-



The structure of another eruption is revealed when a black-and-white photograph is electronically processed so the colors represent different intensities of radiation. Seeing beneath surface is trickier yet.

sands of miles into space. Until recently, the source of all of this fierce energy—the driving force behind the sun—was a mystery.

During the 19th century, scientists calculated how long an object as big as the sun would burn if it were made of coal or gasoline and invariably concluded that if the sun were simply burning, it would never have lasted long enough for life to develop on the Earth. In this century, however, we have discovered a far more potent and compact form of energy in the nucleus of the atom. When atomic nuclei combine with each other to form larger nuclei (a process we call fusion), some of the mass of the original nuclei is converted into energy according to Einstein's famous formula $E = mc^2$. The energy released by this fusion process has been demonstrated here on Earth in the hydrogen bomb. A more attractive aspect of fusion is seen in the attempts of scientists to control it as an energy source. By now, many steps in the solar fusion process have been duplicated in accelerators here on Earth (p. 80), and scientists have created plasmas (extremely hot, electrically charged concentrations of gases) whose temperatures approach that of the sun (p. 77). A controlled fusion reaction, however, is still somewhat in the future.

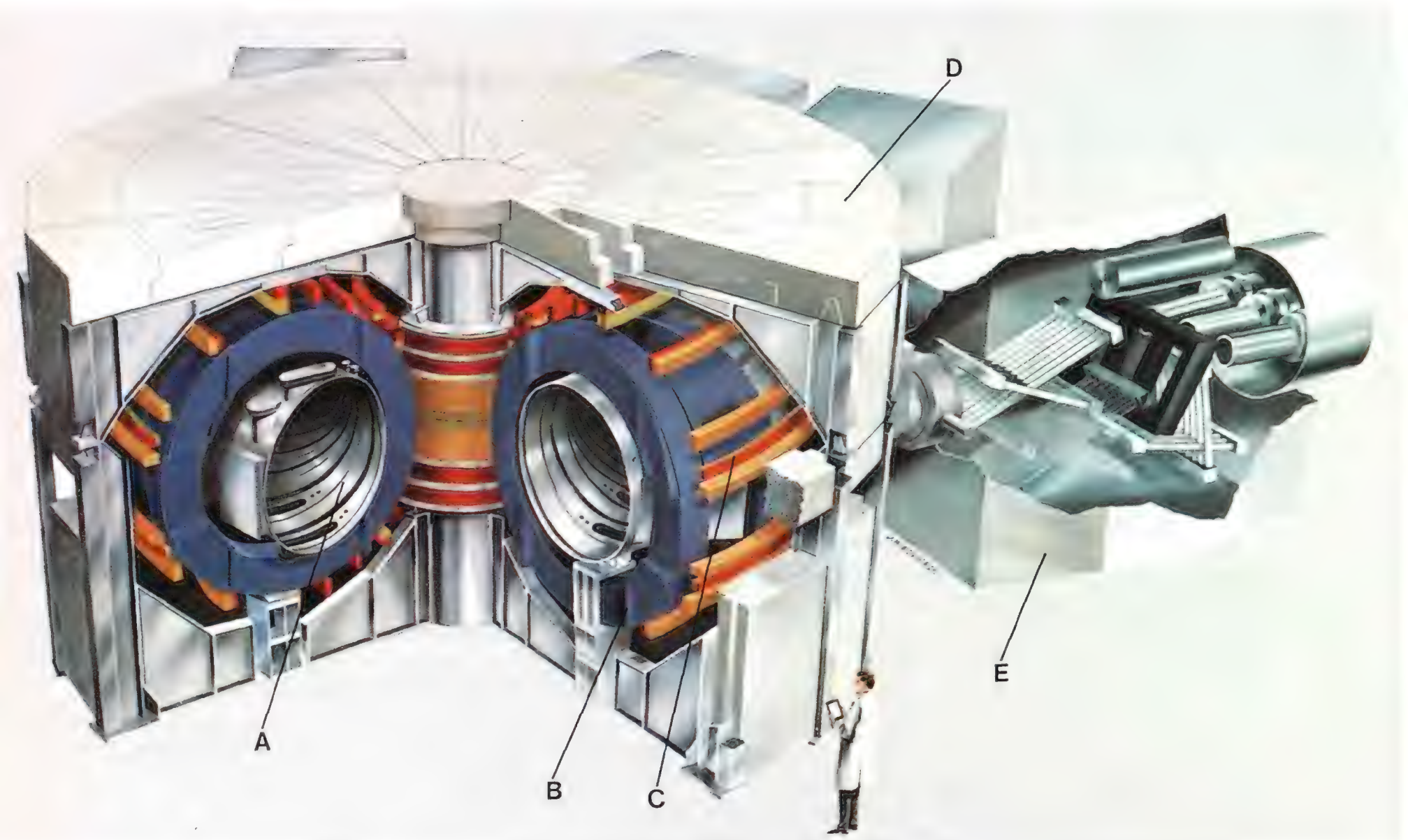
From a purely scientific point of view, the first important application of the principle of fusion was in the understanding it gave us of the sun. According to our present ideas of how the sun and other stars work, the light and energy which we see streaming out of the surface are produced in a gigantic fusion "reactor" deep inside the sun's core. Here, where the temperature exceeds 27 million degrees Fahrenheit, the nuclei of hydrogen atoms (called protons) are combined in nuclear processes to form helium nuclei, giving off energy in the process (the first step is shown on page 78). It is this energy, pushing outward from the center of the sun, that keeps the sun from collapsing on itself like a spent balloon under the force of its own tremendous gravity. It is also this energy which, when it

A University of Virginia physicist, Dr. Trefil kept SMITHSONIAN *readers posted on the subatomic world in the July 1975 and November 1976 issues.*

reaches the sun's surface, travels to the Earth where, as light and heat, it is the ultimate source of life.

While scientists understood the principles of fusion, no one had ever been able to look into a star and actually see the process going on. All that had been seen of stars was the surface. To understand the importance of this statement, let's think a little about what happens to light given off by the fusion process in the center of the star. When light tries to leave the center of the sun, it does not find the going particularly easy. It has to travel more than 400,000 miles through material that is, at least near the center, about 100 times as dense as water. When we think of the difficulty that light has in penetrating to the bottom of the ocean (a mere two miles or so down), we can understand that light coming from the center of the sun will not reach the surface without incident.

There are a number of things that can happen to the light on its way out. It can collide with atoms and

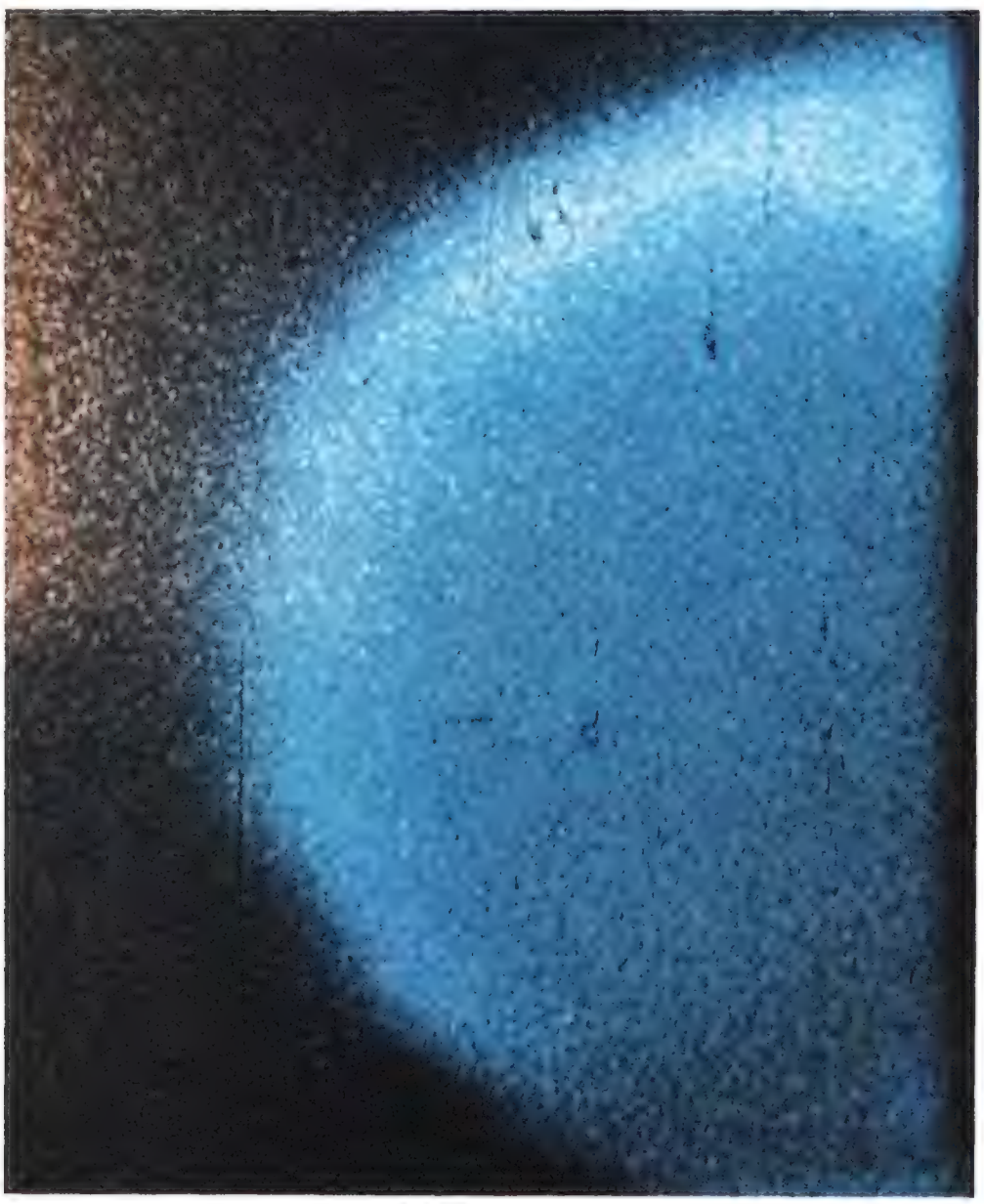


Scientists hope someday to duplicate the sun's energy source in devices like this, the Tokamak Fusion Test Reactor at Princeton. Hot plasma (ionized gas) is contained magnetically in the doughnut-shaped vacuum vessel (A). Huge magnets (B) around tunnel hold plasma, while other magnets (C) help heat and confine it. Shielding (D) traps radiation produced by reactor. Gas injected from right (E) aids heating.

be scattered from its course or even turned back. It can be absorbed and reemitted in a number of ways, over and over again, by the matter that makes up the bulk of the sun. In fact, when all of this is taken into account, it turns out that the light that is coming from the surface of the sun right now actually left the center more than a million years ago.

To use a sports analogy, the process by which light (and other energy) percolates from the fusion reaction in the sun's core to the outside is more like the progress of a running back being knocked around by tacklers than it is like the straight-line motion of a sprinter. Thus, anything we see when we look at the sun will tell us only about the solar surface, and not the core.

This situation is at once gratifying and disturbing. It's gratifying to the scientist because it allows him to use his knowledge of the laws of physics to construct a picture of the solar interior without being able to see it. It is disturbing because there is always that nagging doubt that somehow we are missing something. And so astronomers began to think about experiments that might allow us to "see" the core.



The bright blue cloud is a hot plasma magnetically confined in an earlier fusion apparatus at Princeton. Though gas reaches a temperature of millions of degrees, it still is not hot enough for fusion reaction.

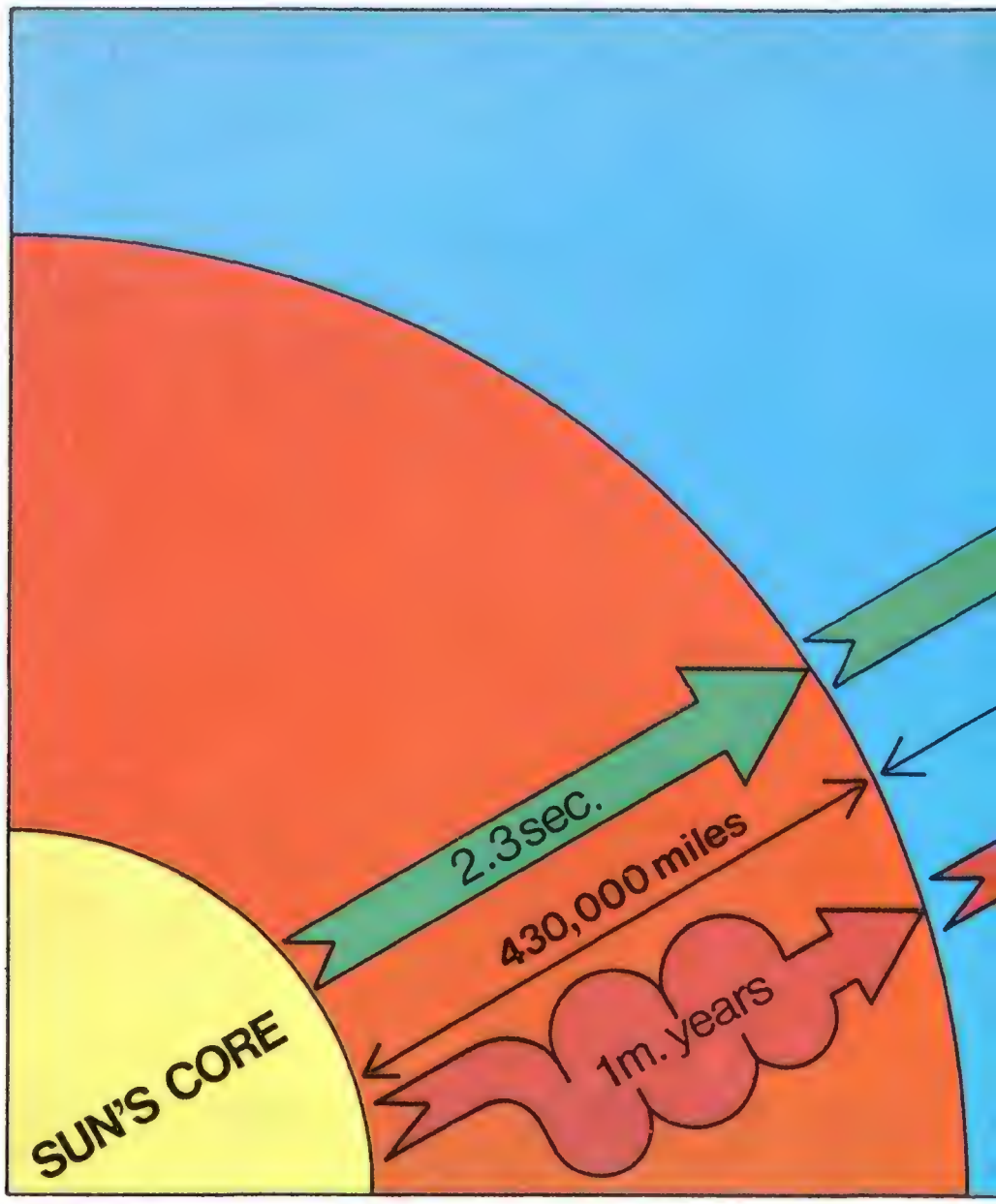
Just as nuclear physics solved the riddle of the sun's energy source, it provided an answer to this problem as well. By 1930 Wolfgang Pauli had proposed the existence of a new subatomic particle, one with no electric charge. Enrico Fermi, the man who later built the world's first nuclear reactor in Chicago, christened the new particle the neutrino ("little neutral one") and worked out its role in the form of radioactivity known as beta decay. Scientists felt such a particle ought to exist because in some nuclear reactions there seemed to be more energy going in than was observed coming out. If there were a new particle that was difficult to detect, then it could carry away the excess energy without being seen and physicists would not have to give up the law of conservation of energy.

Now when we say that we "detect" a particle, we don't mean that we actually see it—particles are much too small for that. What we mean is that we see some effect of the particle's presence. For example, the particle may collide with an atom and knock off some electrons, or it may split a nucleus as it passes. We can only detect a particle if it interacts with matter in some way; so that when we say that the neutrino is hard to detect we are really saying that it does not interact very much with ordinary matter. In fact, according to classical theory the interaction of neutrinos with ordinary matter is so weak that a neutrino could pass through a block of lead that stretched from here to the nearest star without disturbing any of the atoms in its path! Small wonder, then, that the particle wasn't detected until 1956, after a 26-year search.

Neutrinos offer "view" of core

Two properties of neutrinos suggest them as a tool of solar research. The first is that they are given off in nuclear reactions (including the fusion going on in the sun). The second is that unlike the particles of ordinary light that undergo innumerable changes just getting to the sun's surface, neutrinos can go from the core to the outer surface of the sun and then come across 93 million miles of empty space to the Earth without any change at all. Thus, if we could somehow detect the neutrinos coming from the sun, we would be able to "see" into the core for the first time.

But of course the very property of neutrinos that makes them so potentially useful as a probe of the sun's interior makes them very difficult to catch in a measuring apparatus on the Earth. After all, if we are to know that a neutrino has been somewhere, we have to see some effect of its presence on other matter. If a neutrino can get out of the sun without interacting,



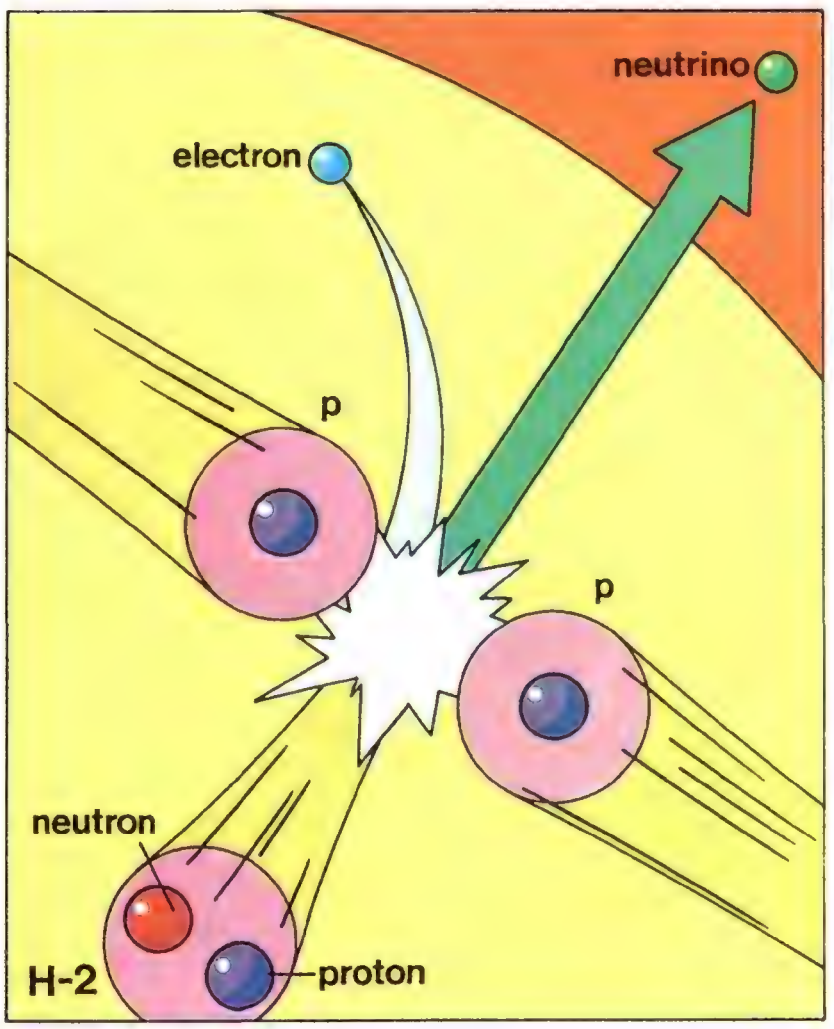
Neutrinos and ordinary radiation (including light) take the same amount of time to get from the surface

it is unlikely to do so in a relatively minuscule experimental setup on the Earth.

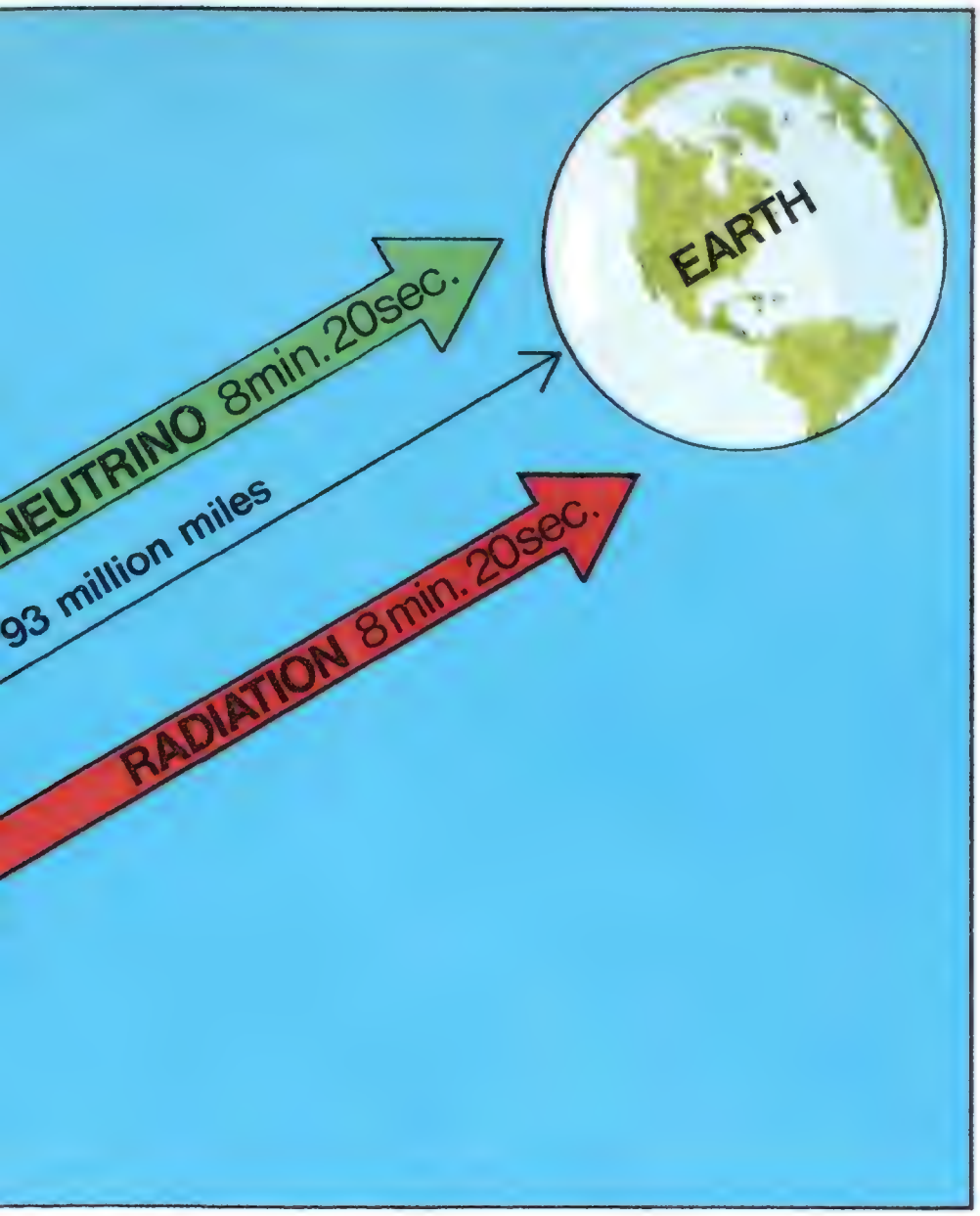
To get some idea of just how elusive a neutrino is, consider the following fact: right now, as you read this article, neutrinos from the sun are passing through your body at the rate of billions per second. This has been going on ever since you were born, and will continue for the rest of your life. It doesn't even matter if it's night, with the entire planet between you and the sun, because neutrinos can pass quite easily through the solid Earth! If you think of your body as a neutrino detector, you may ask how often one of them will actually interact with one of your atoms. The answer is about once every ten years. So the scientist is on the horns of a dilemma—on the one hand any particle that interacts easily with matter (and is therefore easy to detect) will never make it out of the sun, while on the other hand the one particle which interacts so little that it can get out of the sun is very difficult to catch when it gets to the Earth. Neutrinos *can* be detected in the laboratory by sending billions of them down the beam of an accelerator in the hopes that one will hit a target—but one rarely does.

More than a decade ago a group of scientists led by Raymond Davis of Brookhaven National Laboratory and John Bahcall, then of the California Institute of Technology, now at The Institute for Advanced Study, began to think seriously about this problem. They realized that the neutrino given off by one of the reactions in the fusion process would have a high probability (at least for a neutrino) of interacting with chlorine atoms, changing them to argon in the process. The argon would be radioactive, and relatively easy to detect. Using this basic fact, they developed an experiment which is truly unique.

The heart of the apparatus is a tank that holds 100,000 gallons of perchloroethylene (ordinary clean-



In a reaction at the sun's core, two protons (p) collide, forming atom of deuterium (chemical symbol H-2) and emitting extra electron and a neutrino.

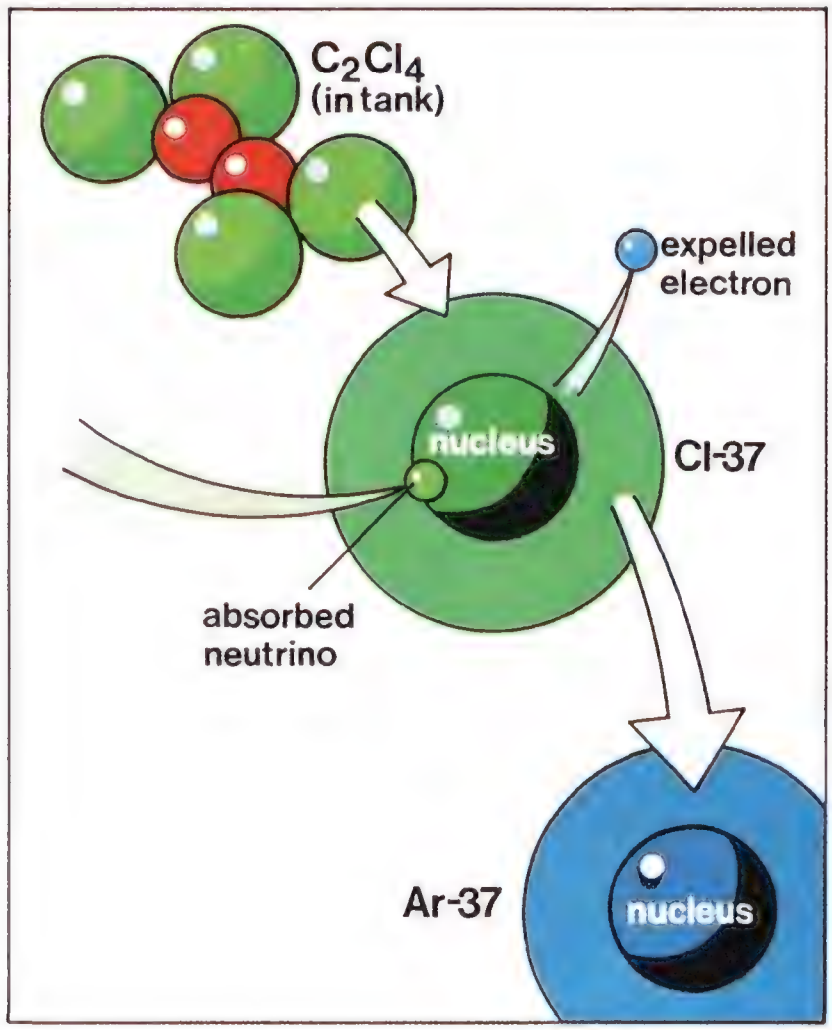


of the sun to Earth, but the light we see today may have taken a million years to get to the sun's surface.

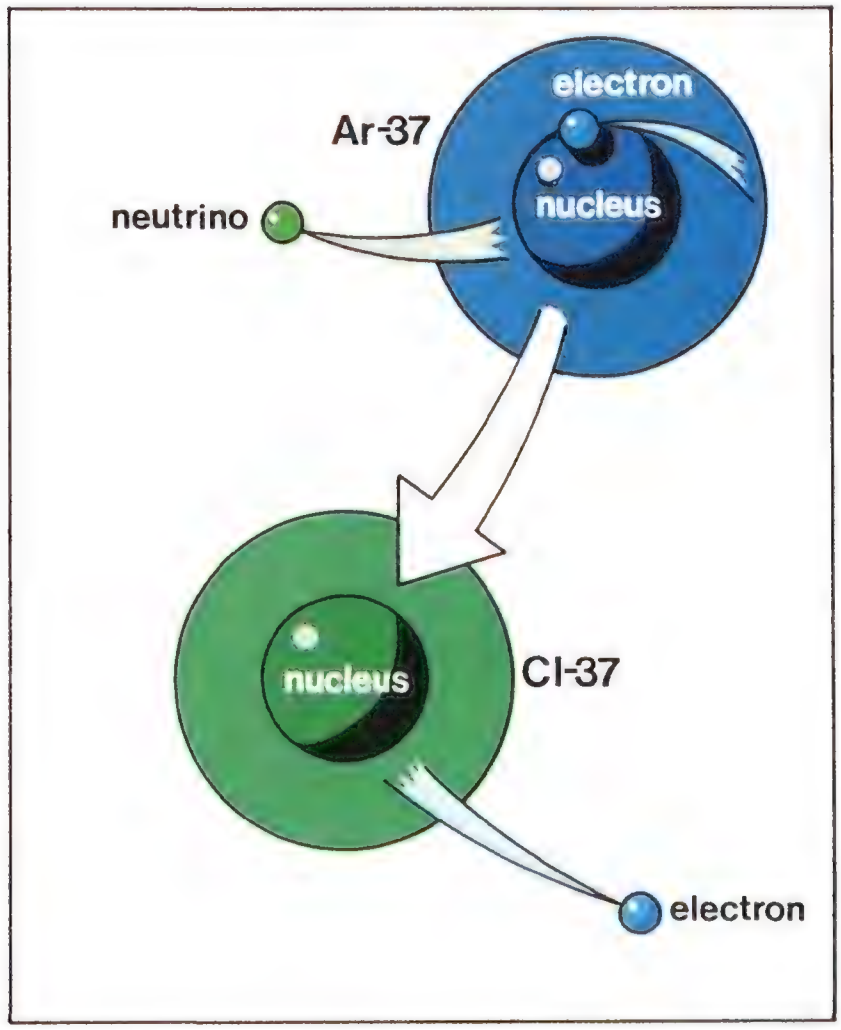
ing fluid), enough to fill ten railroad tank cars. At a meeting describing some early results of the experiment, Bahcall pointed out that this provided a nice escape hatch for the experimenters—if they failed, they could always go into the cleaning business!

If our ideas about how the sun generates its energy are correct, then about once a day a neutrino from the sun should hit a chlorine atom in the cleaning fluid and change it into an argon atom and an extra electron. If we let these reactions go on for three months or so, we would then be able to "detect" the neutrinos by counting the atoms of argon they left behind in the cleaning fluid. The argon atoms would be "visible" because the particular kind of argon produced is radioactive, and thus its presence can be monitored in much the same way that radioactive tracers are detected in medical diagnosis. Even so, finding a needle in a haystack would be simple compared to this task.

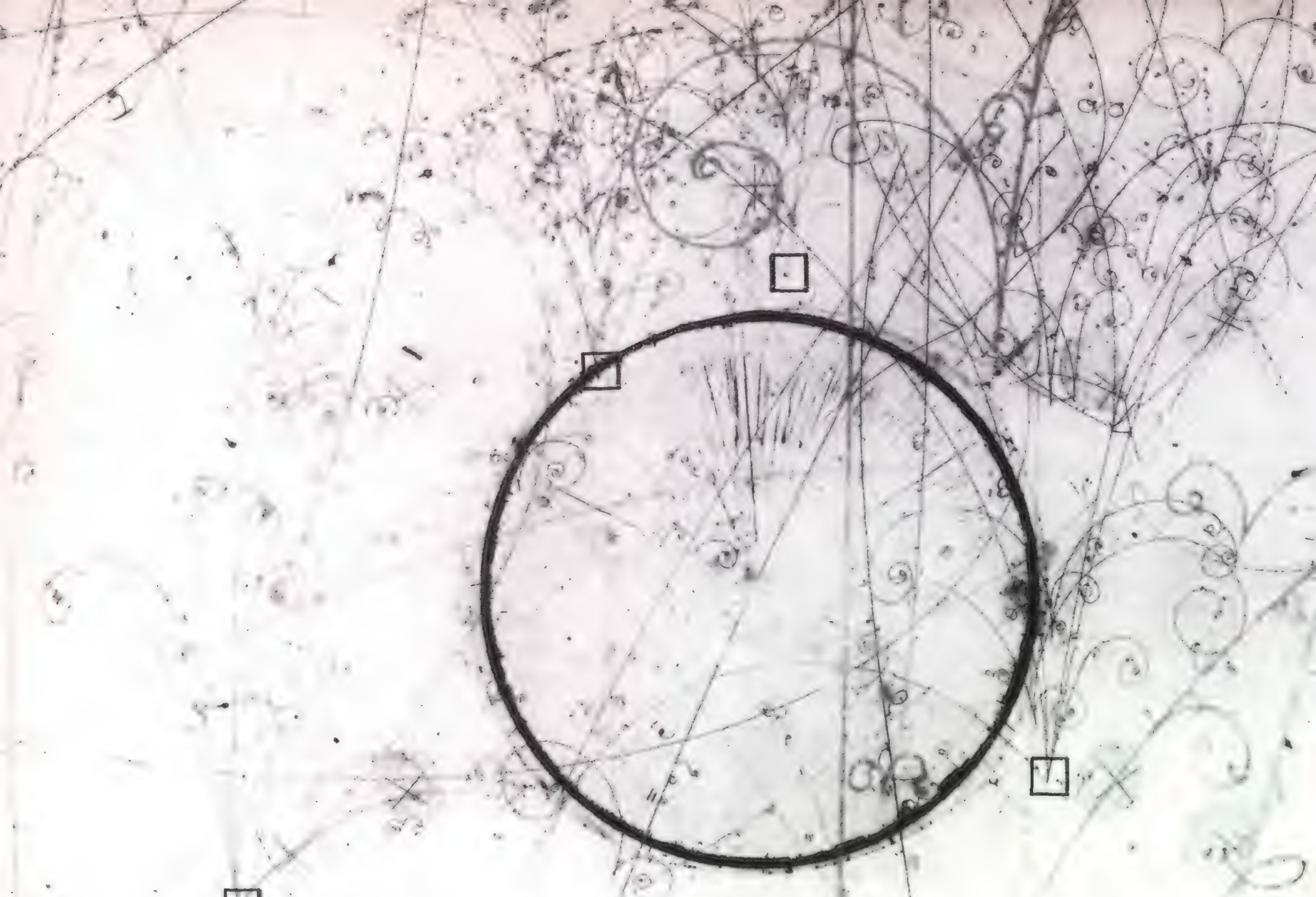
Nevertheless, by taking enormous care and by shielding the tank of cleaning fluid by placing it 4,800 feet underground in the Homestake mine in Lead, South Dakota, the experimenters were able to make the experiment work and were actually able to "see" into the center of the sun. They were detecting argon that could be produced by neutrinos coming from the



Reaching Earth, the neutrino hits a chlorine atom (Cl-37) in a molecule of cleaning fluid (C_2Cl_4). Atom expels an electron and becomes argon (Ar-37).



You can't just count argon atoms to find out how many neutrinos hit; some argon atoms will spontaneously reverse the process and become chlorine atoms again.



Four neutrinos revealed their presence (billions went undetected) in this photo from bubble chamber at Fermi National Accelerator Laboratory in Illinois. The squares mark points where neutrinos entered picture from bottom. Each hit an atomic nucleus, creating sprays of curling tracks moving upward. Every line in picture is the track of an electrically charged particle; the circle is only for reference.

sun. Then came the surprise: there were not nearly as many neutrinos as there should have been. Conventional solar theories predicted about one neutrino interaction per day in the cleaning fluid, with one argon atom per day left behind for the detection process. When the apparatus was turned on, however, the results were consistently lower. Instead of a count per day, the experimenters were finding a count every three to five days!

So the first discovery made with this enormous apparatus was that some of the neutrinos from the sun were not there. Somewhere in the imposing scientific edifice that stood behind the predictions was a flaw. But where?

The first reaction of the scientific community was typical of the reception of a startling new result—most scientists simply ignored it, hoping that a mistake in the experiment would be found and that the whole thing would just go away. As the years went by, however, this became less and less possible. For one thing, the experiment itself was checked and tested. For another, the individual nuclear reactions that are present in the fusion process were measured accurately in laboratories without any surprises turning up. Thus, the question of why the neutrinos aren't there has progressed over the last ten years from an interesting but unimportant puzzle to one of the major unsolved scientific problems of our time. There just doesn't seem to be any way around it—something is wrong somewhere.

What that "something" is has become a matter of dispute between scientists in different fields. Astronomers tend to point the finger of blame at physicists, suggesting that either the nuclear processes are not well enough known or that something happens to the neutrinos between the Earth and the sun. Physicists, on the other hand, tend to shrug this off and suggest that the astronomers don't really know as much about

A promise kept.

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the sun's structure as they say they do. Even climatologists engaged in the study of the history of the Earth's weather get into the act, as we shall see. The general feeling of all of the scientists that I talked to about this problem was that the problem was not with their field, but was somewhere else.

Some solutions to the neutrino problem have been proposed. Astronomers have suggested a number of ways that the lack of neutrinos could be blamed on some special features of the sun's history—comets raining on the sun and depositing a layer of heavy elements in the solar surface, for example, or a hypothesis in which the inside of the sun rotates much more rapidly than the outside. In each case, however, other astronomers have been quick to point out that there is no evidence of such effects anywhere among the millions of stars that we can see. Why should the sun be special?

Others have proposed theories which take the solar neutrino evidence at its face value. If the neutrinos tell us that most of the fusion reactions inside the sun have been "switched off," so be it. After all, the light we see from the sun started out from the interior a million years ago, while the neutrinos got from there to here in about eight minutes. These theories suggest that in the intervening million years (which is a short time as the life cycle of stars go) something has happened. Perhaps the sun *is* switched off.

Anything that turns off the fusion reaction will also cause a long-term cooling trend in the sun, and this trend will presumably be reflected in the weather on Earth. Yet climatologists who study such things can find no evidence for such a trend, even though they can trace the effect of the regular tiny wobbles in the Earth's orbit on the size of glaciers and relate them to the ice ages (SMITHSONIAN, January 1978). So if the sun is turned off, it must have happened recently.

Other people have suggested that the answer lies in particle physics—that something must happen to the neutrinos between the time they leave the interior of the sun and the time they arrive at the Earth. Particle physicists tend to dismiss this, pointing out that neutrinos have been produced for years with no evidence whatever of any funny business going on.

Perhaps the flavor of this mutual finger-pointing between different scientific groups can be captured if I may paraphrase some words of Isaac Asimov to describe my own reactions. "Gentle reader, I am a particle physicist, so if someone tells me that climatologists have missed the single most important trend in the Earth's weather, I will smile. If someone tells me that astronomers don't really know much about the interior of stars, I will grin. If someone tells me that nuclear physicists have mismeasured a reaction by a factor of 100, I will burst into hysterical laughter. But if someone tells me that something happens to those neutrinos between the sun and here, then, by God, they've gone too far!"

Nevertheless, the continued failure of scientists in other fields to come up with a solution has prompted some particle physicists to go beyond a posture of total disbelief and speculate about whether there could be some unexpected property of the neutrino that might provide a way out. They are looking for a new property that would both resolve the dilemma of the missing neutrinos and be "safe" in the sense that no experiment done so far could have revealed the new property.

That's where things stand right now. When the absence of solar neutrinos was first announced, scientists felt that there were probably many ways of explaining the result without doing violence to our ideas about the processes that go on in the sun. As time has passed, the options associated with these easy ways out of the dilemma have closed one by one until now it seems that there is no easy way out. The fact that scientists from different fields tend to put the blame on fields outside of their own speciality may tell us something about human nature, but it also tells us something about the magnitude of the problem.

Perhaps the best statement of the attitude of many people was made by Robert Rood, a theoretical astrophysicist at the University of Virginia, who said: "In my own work on this problem I have oscillated between paranoia and complete loss of faith."

Nearly a mile deep in the Homestake Gold Mine in Lead, South Dakota, two Brookhaven scientists check a tank holding 100,000 gallons of cleaning fluid, an "observatory" for neutrinos coming from the sun.

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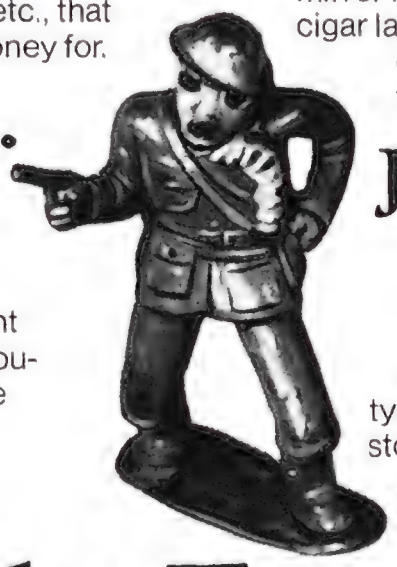

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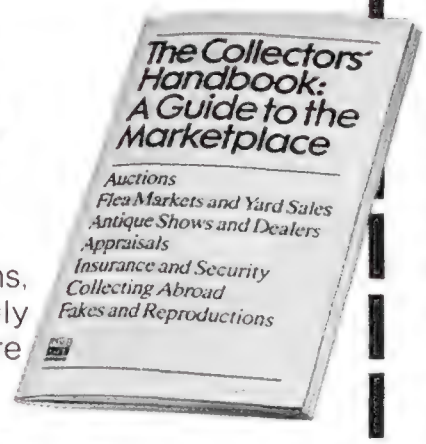

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By Rose Slivka

Erasing the line separating the arts from crafts

Painter, sculptor in metal and clay,
thrower of imaginative pots and plates,
Peter Voulkos is an artistic force

Peter Voulkos is both the innovator and the medium for what has happened in the last 30 years in the creative hybridization of the crafts. In the course of his own individual development he has opened new territories for artists and crafts makers everywhere. Using traditional pottery techniques, he has created an unprecedented body of ceramic works, joining craft and art in an inseparable unity while extending the vistas of both.

Voulkos, who has become a folk and culture hero to young artists, over the last 20 years has made more than 200 appearances at lecture demonstrations, seminars, juries, panel discussions, has taught more than 10,000 students, has had 25 one-man shows and has participated in more than 100 group shows.

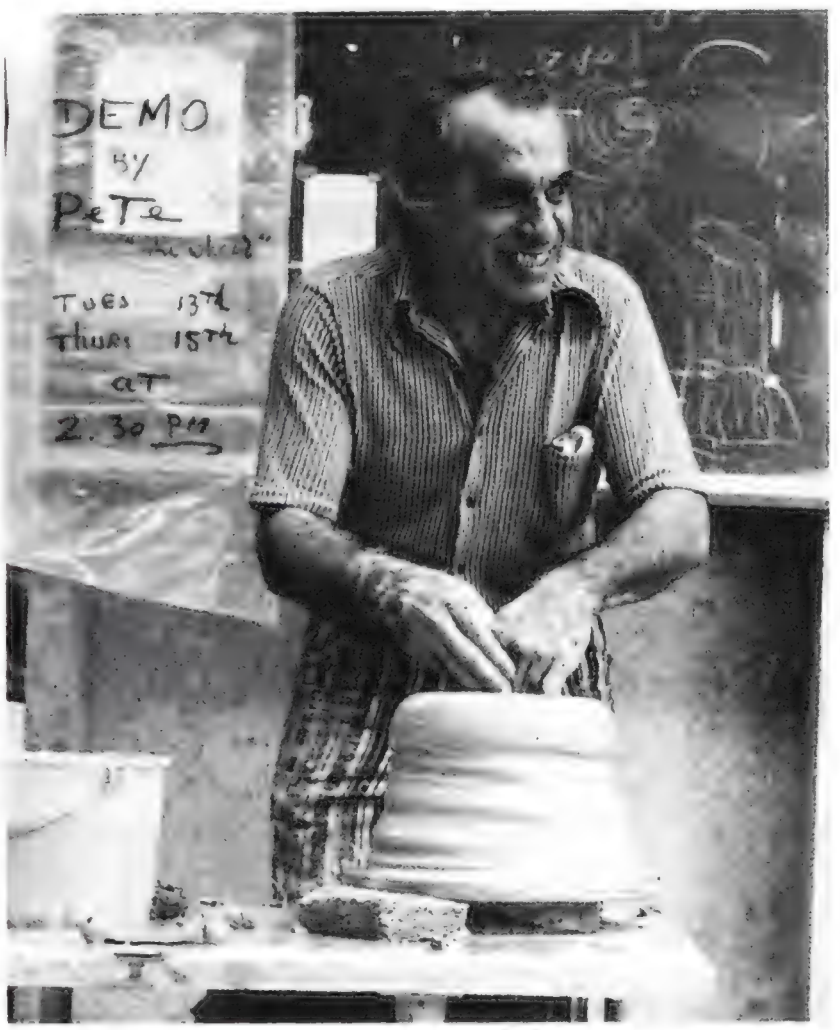
Voulkos' unlimited capacity for work, his large storehouse of energy and strength, is matched by his unquenchable fascination with the material, the clay, and his need to experience it—everything it can do. He works it, plays cowboys and Indians with it.

A part of the Voulkos charm is this sense of primitive strength vested in an intuitive and sharp intelligence. On first meeting, he appears somewhat giantlike, even though never quite straightening from bending over the wheel—he is no more than five-feet-eleven. At a workshop he gave in 1976 he was billed as "Gorilla Man," which he liked. He would rather be the ape than Tarzan.

To mark his stature as an artist, a sweeping retrospective exhibition representing his work from 1948 to the present, and including examples in ceramics, bronze sculptures and paintings, has been mounted at the San Francisco Museum of Modern Art, where it will be on view through April 26. Organized by New York's Museum of Contemporary Crafts under the direction of Paul J. Smith, the show will travel to the Contemporary Arts Museum, Houston, where it will be seen from mid-May through July 15. Then it moves to the Museum of Contemporary Crafts in New York from October 13 through December 31.

Voulkos loves to work at physical tasks, whether it be building a new studio, which he is currently absorbed in doing, or becoming totally involved in machinery and materials. "I love machines," he says. "They perform miracles. They make me feel like a dolt." Once when I visited him in 1975, it was his daily ritual to check on the progress of the conversion of the old Oakland train station, not far from his studio, into a Chinese restaurant. We watched a small crane digging a sewage trough. "I need that machine," Pete said.

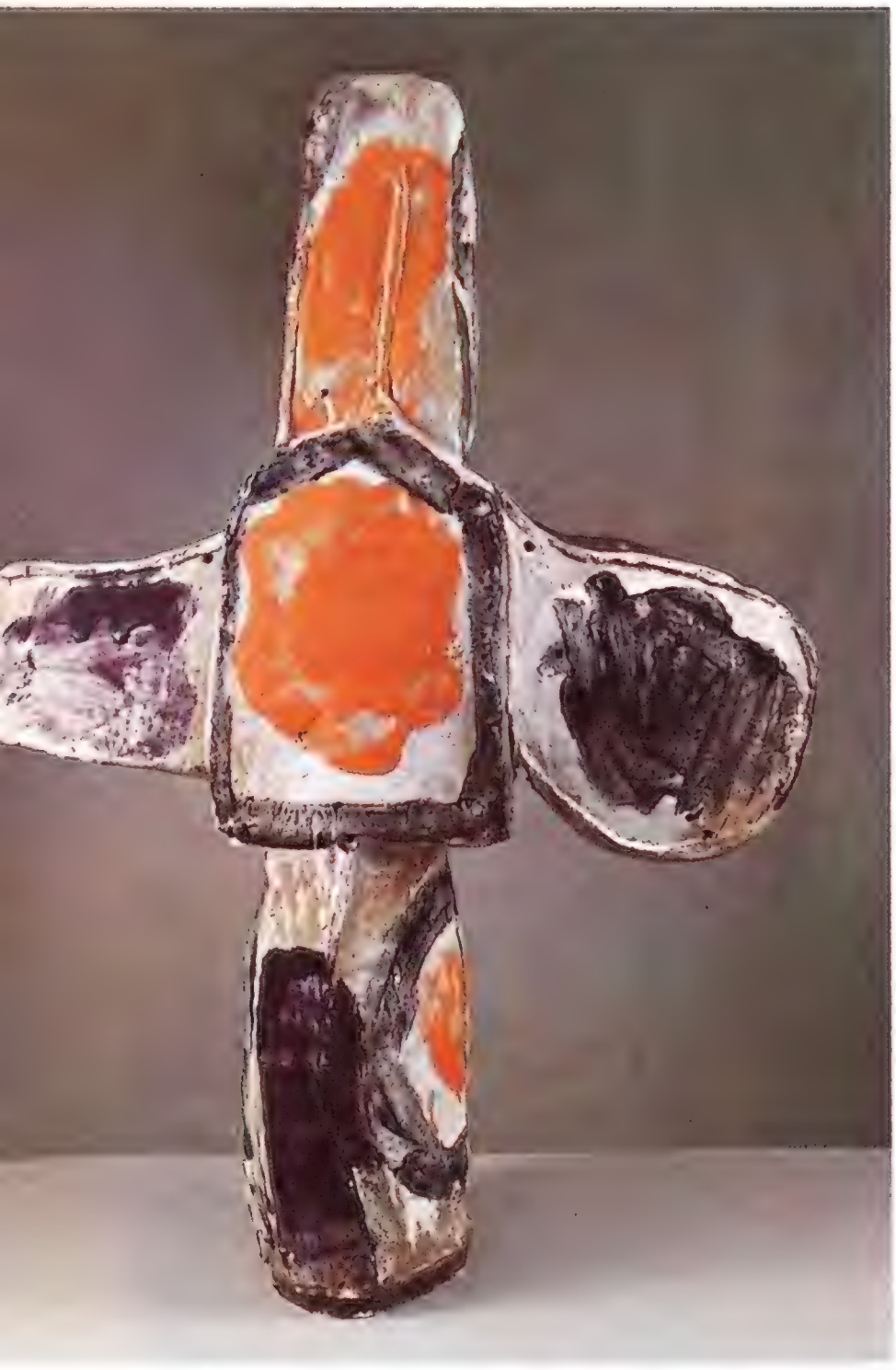
His Berkeley studio is located in an industrial area,



With a typical "Pete's Demo" schedule behind him, at Berkeley, a saturnine Voulkos works playfully.

Gallas Rock, an eight-foot high tour de force of ceramic sculpture, stands in UCLA's sculpture garden.

Delicacy of forms and a relationship of colors appear on Voulkos plate of 1959.

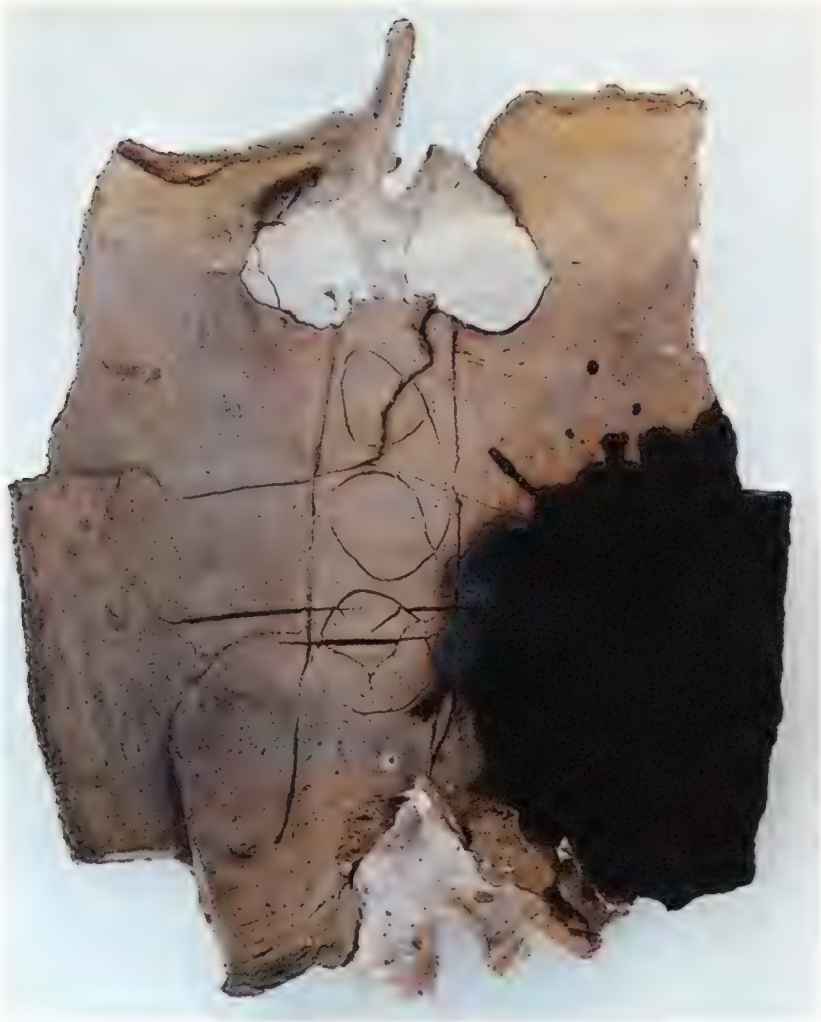


Work from a "breakthrough" period, a Voulkos clay sculpture polychromatic cross, was done in 1959.

surrounded by steel foundries, lumber companies, tool-and-die manufacturers. The air is filled with the chug-chug of machinery, the hiss of big boilers, the clang of metals, the tripping thrum of air hammers, the buzz of saws. We are on our way to the Macaroni Factory, a former pasta plant in Oakland that Voulkos purchased in 1972 and converted into a series of 12 studios for artists. He is at present supervising the remodeling of the third and largest of the buildings he bought; his own new studio—20,000 square feet with 30-foot ceilings—will be located in this one. The building houses a community of 16 artists with as many living-work spaces, the smallest of which is 2,000 square feet.

During his many workshop-demonstrations throughout the country, Voulkos creates his pieces while an audience watches, much as a fine jazz musician creates music while playing before an audience. He is so secure in his craft that he is able to trust his spontaneity, trademark of the Voulkos oeuvre, as a precise reflex of knowledge, experience and timing. At a potters' convention called the "Supermud" held at Pennsylvania State University in 1976, where he gave a demonstration before some 2,000 potters and students of clay, he told his audience, "The quicker I work, the better I work. If I start thinking and planning, I start contriving and designing. I work mostly by gut feeling."

At a demonstration, in a striped shirt with holes (his good-luck shirt) and mismatched pants caked and blotched with dried clay, he has taken clay-stained flamenco boots out of the yellow drawstring bag that



An almost archaic feeling of ancient Earth is apparent in this "plate" done in 1963.

More identifiably a plate but nevertheless, like all of his work, it combines art and craft; 1975.

holds his tools—a small ragged sponge, blade, wooden spatula, rib, wire, paring knife. He walks around slowly in front of his audience, eyeing the wheel, eyeing the clay, eyeing the audience, muttering remarks about his mother and her wisdom, stooping and groaning in front of the audience to change his shoes. Suddenly the audience starts to laugh and Voulkos figures he's on. He wets the wheel bat, a plaster disc upon which the clay is worked. The eyebrows go up, the grin widens and he picks up from the table a large mound of clay, about 50 pounds of it—a usual amount for Voulkos. He slaps the clay down on the wheel bat with a resounding thud, plop. He pauses for a moment glowering at the clay, his powerful shoulders hunched, his knees slightly bent, his feet firmly planted, toed in, the stance emphasized by the pointy boots. Then, with his foot on the peddle of the motorized wheel and his hands on the clay, he begins.

To center 50 pounds of clay requires enormous skill and strength. It is characteristic of Voulkos' offhand, self-mocking, "nontechnique" technique, to say, "I'm off-center. But the clay is on." Some people say Voulkos' clay is crooked but he is centered. Tomorrow, with the forms in their leather-hard stage, Voulkos will trim and form, slash and rupture, compose and assemble. And answer accumulating questions.

Editor of Craft Horizons, *the author has just published* Peter Voulkos: A Dialogue with Clay, *New York Graphics Society (Little, Brown).*

What tools do you recommend? "You find your own tools, like you find your own way of working."

How would you define a good pot? "It's a simple matter to pick out a pot's poor qualities but it's impossible to analyze a good pot."

Why do you still consider yourself a potter? "Usually the last thing on my mind is why I am a potter."

On the difference between doing pottery, painting and sculpture: "I started as a painter, and pottery provided another form in which to work. So you have the form of sculpture, the form of pottery, and these forms all feed back into one another. The painting helps the sculpture, the sculpture helps the painting, the pottery helps the sculpture, and so on."

What got you on to this? "Bad toilet training."

What do you feel about the last piece you made? "Best thing I ever did."

He is completely an American artist—and his story is the reflection and expression of the time and place from which he emerged—the post-World War II American art rush, with its declaration of independence from Europe through abstract expressionism.

In 1946 Voulkos was discharged from the Air Force where he had served as a nose gunner, and went back to school under the GI Bill. He had gone home to Bozeman and registered at Montana State University, specializing in art. Voulkos, who was always a night person, says, "I heard that artists didn't have to get up in the morning."

Voulkos studied to become a painter. Clay did not

Progression of Voulkos pots, spanning almost a quarter of a century ranges from delicately decorated work of 1952 (left), at time of his first show, to work of 1970 (center), to complex pot done in 1976.

cross his vision until his graduate year but from the moment he touched clay, it was love. No one could keep him out of the "mudroom." He became friends with the night watchman who would look the other way when Pete crawled through the basement windows after hours to get back into the building to work.

After receiving his MFA from the California School of Arts and Crafts in 1952, he went to work at Archie Bray's brickyard in Helena, Montana, where he made, fired and salt-glazed bricks, and also ran a pottery and conducted workshops for students. Since there was not much actual work—art or craft—to see in Montana at the time, information about what others were doing came to him largely through magazines.

At this time Voulkos still considered painting to be his primary art, and he continued to paint, but he decided to make his living as a production potter. When Pete first told his Greek-born mother he was going to be a potter, she said, "What! Make pots and pans! I thought you gonna be an artist." She dreamed of an artist among her sons. To her it was the highest of Greek aspirations and the most noble of all callings.

In the summer of 1953 Voulkos went to Black Mountain College, near Asheville, North Carolina, to teach at this experimental college directed by Josef Albers, where art was the center of the curriculum. Those three weeks were to change Voulkos' life. He had already been stirred by reproductions of the ceramics of Picasso, Miró and Artigas, by the Zen pottery of the Japanese and Koreans. Now, in an atmosphere of high experimentation, he met artists in every field exploring the new art that was to remake American culture. He became friends with the composers John Cage and Stefan Wolpe, with David Tudor the pianist, Merce Cunningham the dancer, painters Jack Tworkov, Esteban Vicente, Robert Rauschenberg, the poet-potter M. C. Richards, the poet Charles Olson.

M. C. Richards, returning to New York that summer invited Pete to stay with her and David Tudor in their three-room flat on Second Avenue (with bathtub in the kitchen), in the heart of New York's lower East Side.

He experienced the excitement of accessibility—of artists being physically close to one another, being able to exchange views and discuss their work together as a natural part of the working day.

He returned to Helena that fall and continued his work at Archie Bray's, making production pottery—cups, saucers, plates, bottles, casseroles—and expanding his clientele all over the country, but he was restless for change.

At this time, Millard Sheets, director of the Otis Art Institute in Los Angeles, invited Voulkos to head the institute's new ceramics department—so brand-new that when Voulkos arrived in the fall of 1954, the department was nothing but an empty basement.

"The biggest thing that ever happened to me," Voulkos says, "was moving to Los Angeles. Everything started falling into place. I began to go to all the shows —all the openings at galleries and museums I had never been to before, and I really got turned on to painting like never before—especially work by the painters of New York."

In 1954, Los Angeles was the marketplace, dominated by new postwar money looking for cultural respectability and recognition. La Cienega Boulevard began to mushroom with galleries and with curiosity and hunger for the new vision and for the new touch.

Voulkos, walking into the Los Angeles of 1954, was like a boy in a candy store. He was not a visitor, as he had been in New York. He had a job to do, a reputa-

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tion that had preceded him. He was part of the "scene."

Voulkos ran the pot shop as a freewheeling place. Students from outside the art department and non-students began to drop in and work. Among those who became his "crew" were Billy Al Bengston, Michael Frimkess, Ken Price, John Mason, Malcolm McLain, Jerry Rothman, Paul Soldner, Henry Takemoto. They worked in what West Coast collector Fred Marer calls "a 24-hours-a-day, seven-days-a-week-atmosphere."

The Los Angeles clay movement, with Voulkos its acknowledged leader, became the counterpart to the New York movement in painting, and its most direct and vigorous response, its natural extension in a material to which expressive action was intrinsic.

The Los Angeles years, from 1954 to 1959, were the most exciting, intense, obsessive and productive years of Voulkos' career, and sparked the clay movement that was to spread throughout the country and continue in its varying modes of experimentation and stylistic diversity to this day. The participants were the first generation of American ceramists to make their break from European and Oriental traditions.

From 1955 to 1960, he produced more than 5,000 unique pieces, many in the form of plates "with holes for people who don't like soup," bowls, pots and vases "to put your old socks in," and more than 200 pot forms or sculptures under four feet high.

As he reached for larger and larger scale, in 1957 and 1958, he began to experiment with the thrown forms as volumes to be balanced around a basic cylinder skeleton. These developed into the series of massive, voluptuous sculptures—perhaps the largest self-contained ceramic works done in our time.

In 1958 and 1959 alone, Voulkos produced more than 16 ceramic sculptures (not counting the ones that blew up in the kiln), of which the five-foot-five-inch *Black Bulerias* won the Rodin Prize at the first Paris Biennale in 1959. The 17th is the eight-foot high *Gallas Rock* (p. 86), which was commissioned in 1959. This sculpture, made at the crest of the wave of energies with which Voulkos was producing his boldest stacked forms, is composed of about 100 elements—a combination of slabs and wheel-thrown cylinders opened "to let the dark out"—and is the most intricate, technically stunning, and largest ceramic sculpture of that period. In 1975, Julie Gallas donated it to the sculpture garden of the University of California at Los Angeles (where it was installed along with the five-foot-eight-inch high *Soleares*—also known as *Rex Rock*, for its donor, John Rex).

In the fall of 1959, Voulkos left the institute to accept an appointment to the University of California at Berkeley, where he became a full professor. By the time Voulkos moved to Berkeley he was ready to take on the challenge of bronze, eager to reach further for the scale that so intrigued him.

Voulkos found an enormous warehouse on Third Street in the industrial section of Berkeley, adjacent to the tracks of the Southern Pacific. His new space, approximately 10,000 square feet with 20-foot ceilings, allowed him to do the gigantic bronzes toward which he had been striving. He made some of the largest pieces of sculpture ever to be totally fabricated in the sculptor's studio—casting all parts himself—as well as some of the most sophisticated and innovative clay forms made in pure pottery techniques.

Third Street became a magnet for young artists during the Sixties. And Voulkos, a natural Greek patriarch, took them in, turning what could have been chaos into a fertile environment for sculpture.

His unusual life-style and work methods resulted in 1970-71 in the production and installation of two heroic sculptures—*Mr. Ishi* at the Oakland Museum and a commissioned piece for the San Francisco Hall of Justice (opposite page).

Before this piece was installed, some San Francisco police officers called it an "abomination" and announced their "official opposition" to it. But the furor simply attracted the enthusiastic attention of San Franciscans, the City Art Commission stuck to its guns and the complicated installation was completed in the fall of 1971. Today this magnificent, intricate, 30-foot-high monument stands downtown, a triumph of the Voulkos vision.

Voulkos continues—an artistic force—to feel his way as he makes his way—an advocate of the high and risky art of imperfection.

Some San Francisco policemen cried "abomination," but it stands today outside city's Hall of Justice.

By B. Kimball Baker

The St. Patricks fought for their skins, and Mexico

With perverse gallantry this company of the damned, flying their Irish banner, delayed the Yanqui invaders of 1847

On August 20, 1847, was fought one of the fiercest battles of the Mexican-American War. The stout-walled Franciscan convent of San Mateo was valiantly defended by about 1,500 Mexican soldiers against a massive American attack. In the thick of the fighting was John Riley, once a drill sergeant and now brilliant in combat.

Riley was everywhere—rallying troops, preventing the white flag from being raised. His exploits would have earned for many a soldier the Medal of Honor. For Riley they earned a court-martial by U.S. officers and a sentence to hang by the neck until dead. Riley was an officer of the San Patricio Company or Company of St. Patrick, a hard-fighting unit of the Mexican Army formed partly of U.S. Army deserters.

Desertion was nothing new in the military history of this or any other country. But for Brigadier General Zachary Taylor in the winter of 1845 and the spring of 1846, as he encamped his army near the mouth of the Rio Grande in the newly annexed state of Texas, it was an immediate and vexing problem.

"Efforts are continually being made to entice our men to desert," Taylor reported to Washington, "and I regret to say, have met with considerable success." In another dispatch, Taylor noted that any of his soldiers seen attempting to swim across the Rio Grande and refusing to halt would be shot.

Many of Taylor's soldiers were immigrants who had enlisted because they could find no other prospects. Conditions in Taylor's encampment must have made them wish they had looked a little harder, for the winter was wet and bitterly cold, and men shivered in leaking tents around which they banked earth to keep out the wind. Drinking water was brackish; diarrhea and dysentery were rampant. Officers tolerated no laxness on the part of enlisted men. During the long, hard, inactive winter, morale deteriorated.

George Ballentine, an Englishman in the U.S. Army wrote: "The barbarous treatment which soldiers sometimes received from ignorant and brutal officers, and non-commissioned officers on that campaign, were I to relate it in minute detail, would seem almost incredible. I have frequently seen foolish young officers violently strike and assault soldiers on the most slight provocation, while to tie them up by the wrist, as high as their hands would reach, with a gag in their mouths, was a common punishment for trivial offences." He cites such methods of discipline as one of the reasons for desertion.

Ballentine was quick to point out that conditions in the Mexican Army were so much worse that deserting to join it was "literally jumping out of the frying pan into the fire"; but the deserters didn't discover this until it was too late, and the Mexican generals did their best to make desertion seem an attractive step. Major General Mariano Arista, commander of the Mexican Army's Division of the North, held out a promise of Mexican citizenship and 320 acres of land (and even more land to soldiers of high rank) for any American turncoat.

An alarming number of deserters

The Mexican generals opposite Taylor believed that American soldiers were going to desert in large numbers. Ten days after his proclamation, General Arista predicted that 1,500 "Irishmen and Frenchmen" would desert; and a few days after that, General Francisco Mejia anticipated that most of the American 7th Infantry would desert, since it was composed mostly of Irish and Germans.

Such grandiose expectations were based on the fact that many American soldiers were Roman Catholics or were from countries sympathetic to the Mexican cause. (Indeed there were Americans then—as there are now—who felt that the war was nothing more than an imperialistic land grab.) The Mexican generals were also aware of the strong anti-Catholic and anti-immigrant sentiment that then existed in the United States

San Patricio Company, defending convent at Churubusco, is finally swamped by Americans (in flat hats) after last-ditch fighting.

Paintings by Don Troiani

San Patricios earned praise for valor
at Buena Vista, where they first saw action.

—and that was reflected in "nativist" riots and protests directed against immigrants.

Although American soldiers did not desert in anywhere near the masses envisioned by the Mexicans, the numbers were still alarming. One of the earliest was John Riley of the 5th U.S. Infantry. He had requested a pass to attend mass on the Texas side of the Rio Grande, but had instead crossed the river and joined the Mexicans. Riley later asserted that he had been an unwilling recruit, but all the evidence indicates that he accepted the Mexican offer of a lieutenant's commission with alacrity.

Irishman Riley was no stranger to military life or to desertion. He had been stationed in Canada with the 66th Regiment of the British Army, deserted, crossed the border into Michigan, worked for two years on a farm, then enlisted in the U.S. Army at Fort Mackinac. He was an excellent soldier, serving as a recruiting sergeant in New York City, a drill sergeant, and a member of Taylor's forces until his second desertion on April 12, 1846.

Whether Riley's reasons for desertion had to do with anti-Irish sentiment in the army or slow advancement (he had been tabbed as officer material), the Mexicans wasted no time in putting his talents and those of other American deserters to use. About two months after war was declared, Taylor moved his army south toward Monterrey and took the city. A party of deserters, the nucleus of the San Patricio Company, fought at Monterrey, but apparently the unit was not officially formed until December 1846, at San Luis Potosí, about 300 miles south of Monterrey, where Santa Anna was creating a new army to repel the Yanqui invasion. A Mexican pay voucher mentions "the artillery company organized from the deserters of the invading army."

The unit, commanded by Brevet Major Francisco Rosendo Moreno, first saw action on February 23, 1847, at the battle of Buena Vista. Moreno's second-in-command was 1st Lieutenant John Riley. The San Patricios spearheaded one of the long columns marching against the North Americans. The unit suffered casualties of 23 killed and six wounded, and, according to historian Justin Smith, narrowly escaped annihilation; but its performance earned praise in the after-action report, and Lieutenant Riley was made a brevet captain.

A sidelight to the action around Buena Vista is a description of the San Patricios by an American prisoner—one of a band of Kentucky cavalrymen captured by the Mexicans before the battle. As the

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Bedraggled Kentucky cavalrymen (foreground), while being led to the rear as prisoners, jeer

prisoners were being marched south, they passed Santa Anna's army on its way to the front, and one of them wrote: "Among this mighty host we passed was O'Reilly [sic] and his company of deserters bearing aloft in high disgrace the holy banner of St. Patrick." The flag of the San Patricio unit was embroidered or painted with representations of St. Patrick, the harp of Erin and the shamrock, upon a green field.

By April 1847, Major General Winfield Scott, "Old Fuss and Feathers," had been made commander of U.S. forces in Mexico and had landed an army and taken Veracruz. Most of Taylor's troops had been moved to Mexico's east coast to join up with Scott on a drive to Mexico City. Santa Anna had formed the Army of the East at Jalapa to intercept Scott's force, and the San Patricios were placed under Santa Anna's new command. They were not all American deserters; some were foreigners who had been living in Mexico.

Scott's force, although short of supplies, advanced steadily into Mexico's interior and came hard upon the ill-fated convent of San Mateo. The route there was not easy and was interrupted by a hard-fought battle (which cost the Mexicans dearly) at Cerro Gordo. After occupying Puebla, where he awaited new men, Scott moved on, fighting at Contreras and eventually passing through a rocky, pockmarked lava field called the pedregal ("stony place"). One of the guides getting the troops through was an intrepid young engineer captain named Robert E. Lee.

The Mexican position around the convent was another fearsome obstacle. Several hundred yards from it, on the Churubusco River, was a *tête de pont*, or fortified bridgehead. The ground around the convent was full of high corn, ditches and dikes. The convent itself was surrounded by a high wall and partly fortified with earthworks containing seven guns. At the head of the Bridge of Churubusco was a battery of five pieces, protected by the Tlapa Battalion and the San Patricios who had marched with the Independencia and Bravos battalions of the Mexico City National Guard. Possibly Mexican distrust of the San Patricios caused them to be sandwiched between the National Guard units on the march. Events proved that distrust to be completely unfounded.

The overconfident Americans met the stiffest resistance they had yet encountered. Time after time they advanced, and time after time they were repulsed. Their footing was treacherous, and the fire directed upon them by the Mexican guns—many of them served by the San Patricios—was well-aimed and withering. It was reported that the deserters took particular satisfaction in shooting at their former officers.

at deserters with their St. Patrick's flag, marching toward the front—and toward their final doom.

Ammunition runs short

When the defenders of the convent called for more munitions, Santa Anna sent a wagon and ordered the Tlapa and San Patricio units in as well. Unfortunately for the Mexicans the cartridges in the wagon were not the right caliber for the weapons at the convent. Only the San Patricios could use them. And use them they did, to devastating effect.

The ferocity (or desperation) with which the San Patricios fought at Churubusco probably illustrated more than anything else, however, their certain knowledge of the fate awaiting captured deserters. It was said that three times the Mexicans defending the convent tried to raise the white flag of surrender, and three times San Patricios ripped it down, even killing one flag holder.

Not until the bridge had been taken and a pair of heavy guns was able to bombard the convent did it fall into American hands. By that time, the remaining defenders had been forced into the convent building. As the bombardment continued, an officer with the

At Churubusco, a San Patricio attacks a Mexican trying to wave surrender flag.

leading American unit, Captain James M. Smith of the 3d Infantry, entered the convent and, realizing that most of its defenders were now without ammunition, raised the white flag himself to prevent further slaughter. Given a few hundred more men like Riley's group, Santa Anna said, and the Mexicans would have won the victory.

The battle of Churubusco was full of strange ironies. In the fighting, Riley faced the company in which he served before deserting. And along with the American troops that entered the convent after it fell was another unit of turncoats—only this one was with the American army. They were Dominguez' Scouts, sometimes called the Spy Company, the 200-man mounted troop of Mexicans led by a *bandido*-turned-guerrilla named Manuel Dominguez. The editor of an English edition of a Mexican account of the war explains that these men felt that during the conflict they could no longer survive at their trade of highway robbery. "To make, therefore, another honest living, in another honest way, they changed from robbers to traitors." Had these Scouts been infantry rather than cavalry, Mexicans fighting on the American side might well have battled against Americans fighting on the side of Mexico.

When the smoke of battle cleared, there were 137 American soldiers killed, 879 wounded and 40 missing. Eighty-five of the more than 200 San Patricios, including Moreno, Riley and two lieutenants, were captured; the rest were either killed or dispersed. Other Mexican losses, including 1,259 prisoners (three of whom were generals) and artillery, were extremely heavy.

Two courts-martial on August 28, one at Tacubaya, the other at San Angel, tried the 72 San Patricios who were American deserters. Two San Patricios who were foreign residents in Mexico, Englishman John Wilton and Irishman Thomas O'Connor, turned "state's evidence" and testified for the prosecution.

Thirteen of the prisoners had nothing to say for themselves. Two men, Frederick Fogel and John Klager, could not even speak English and required an interpreter. Only four pleaded guilty. Most of those addressing the court excused themselves by claiming to have been captured and forced into Mexican service after bouts of drunkenness. Dennis Conahan was the only San Patricio romantic enough to plead that he had been captured after spending the night with his Mexican sweetheart.

It is clear from the testimony that deserters were harshly treated in the streets of Mexico City, and that this fact, or Riley's immense powers of persuasion, caused some of the strayed American soldiers to take up the arms of their enemy. A few of the accused claimed to have enlisted because they were told that their only duty would be to escort foreigners out of the capital. Riley himself submitted to the court a long, articulate, exculpatory letter. It had little effect upon his judges. Whatever their defenses, the men in the dock could not deny that they had been captured while in battle against their former comrades.

Sentences of death and lashing

All 29 deserters tried at Tacubaya were sentenced to hang. Of the 43 tried at San Angel, 36 were sentenced to hang, two to be shot, and three to be lashed and branded. Lewis Prefier, who had gone AWOL just two weeks before and who was described to the court by his superiors as "a man not in his proper senses" and "a perfect simpleton," was sentenced with forfeiture of pay and a general discharge. Edward Ellis could not be sentenced because nobody had bothered to get his signature on his enlistment papers. Bureaucracy saved him.

General Scott himself reviewed every case and wherever mitigating circumstances predominated or the court recommended clemency, he reduced or remitted sentence. The verdicts against five men sentenced to die were remitted: John Brooke, who had obviously been under coercion and whom the court,

in an uncharacteristic compliment, declared to be "quite a lad"; David McElroy, who enlisted at 14, headed into Mexico in a fit of homesickness and appeared to the court as "a mere boy"; Henry Newer; Sergeant Abraham Fitzpatrick, an outstanding career soldier who had been captured by the Mexicans and forced to join the San Patricios. Edward Herron (or McHerron), a 60-year-old soldier whose son fought with distinction at Churubusco in the same company from which his father had deserted, was pardoned "out of consideration" for his son.

The sentence of three of those condemned to hang, including Riley, was reduced by Scott to lashing and branding because they had gone over to the Mexicans before war was officially declared and thus were not liable to execution. Nine others sentenced to die had their punishments similarly reduced.

It is easy to imagine the resentment among American ranks at Scott's reduction of Riley's sentence. Feelings ran high toward all the deserters; without the intervention of officers at the convent, according to one account, "every deserter would have been bayoneted or shot dead upon the spot." And such feelings ran particularly high among the many sons of Erin who had remained loyal and who felt stigmatized by the Irish renegades. But the chief culprit was Riley, and it irked every soldier to see that he escaped through a technicality.

Of the 50 men whose sentences to hang had been upheld, 16 were hanged at San Angel on September 10, four at Mixcoac the next day, and 30 at the same place two days later. Each of the first 16 was dressed in his Mexican uniform with his hands pinioned. Over the heads of the men loomed a 40-foot-high gallows from which hung the nooses around their necks. Under their feet were eight mule-drawn wagons, alternately facing east and west. The men were in a straight line, two on the back of each wagon. At the sound of a drum tap, a teamster in the saddle of each lead mule whipped his team, pulling the wagons out from under the men. It was said one man's rope did not jerk sharply enough for the drop to break his neck and he was strangled.

Captured survivors of the deserter company are quickly court-martialed and sentenced.

"He wouldn't soldier well"

Ranged in front of the gallows were five priests with crucifixes in their hands, awaiting the bodies of seven who declared themselves Roman Catholics. These were taken by the priests to consecrated burial grounds; the rest were buried under the gallows. Lashing and branding was no mild form of retribution, according to descriptions. There were 50 lashes per man, and they were laid on with rawhide whips by brawny Mexican muleteers. The backs of those lashed "had the appearance of a pounded piece of raw beef, the blood oozing from every stripe as given." The brand was a capital "D" two inches high burned into the cheekbone with a red-hot iron.

Those sentenced to this punishment were also required to dig the graves of the men who were hanged, and, in a final embarrassment, when the army left Mexico, were drummed out of camp to the tune of *The Rogue's March:*

> Poor old soldier, poor old soldier,
> Tarred and feathered and sent to hell,
> Because he wouldn't soldier well.

Riley suffered particularly. Intentionally or not, his brander burned the "D" into his handsome face upside down and had to turn the brand around and administer it again.

Colonel William S. Harney, who supervised the execution of the 30 San Patricios hanged at Mixcoac, devised an ingenious way to prolong their agony. The final battle for Mexico City was then in progress, and Harney made the men stand on the scaffold for hours, in full view of the fighting, until the Mexican flag over Chapultepec Castle was replaced by the Stars and Stripes, signaling ultimate victory. The moment was tinged with pathos, for as Harney gave the sign for the

scaffold's traps to be sprung, the traitors loosed a round of cheers for the American cause.

During the American occupation of Mexico City, the deserters who had been lashed and branded were confined at hard labor in the castle and then the Citadel. In a general order, General Scott declared: "Let all our soldiers, Protestant and Catholic, remember the fate of the deserters taken at Churubusco."

The release of the San Patricios was one of Santa Anna's conditions for negotiating peace, and was accepted. On June 1, 1848, as the American Army left the conquered capital, John Riley and the other surviving deserters, heads shaved and buttons ripped off their jackets, were dishonorably discharged and drummed out of camp, disgraced but free. Riley, bitter and unrepentant, rejoined his Mexican unit, amazingly still in existence. He rose to the rank of colonel, but, with his nose for trouble, became involved in a military revolt and was asked to leave the country.

Back in the United States, he reached the apex of his notoriety. In 1849 he sued the U.S. government for $50,000 for having lashed and branded him. A jury ruled against him—and billed him for court costs.

Over the succeeding years, the strange story of the San Patricio Company has often been embroiled in controversy. In 1852, General Scott ran for President. He was praised in some quarters for promptly executing deserters, damned in other quarters for hanging people when the war was all but over. The dispute had little effect on his overwhelming loss at the polls.

A more serious controversy involved allegations by "nativists" that the San Patricios were completely or predominantly Irish or Catholic. The *Know-Nothing Almanac for 1856* said the San Patricio unit was "composed of Irishmen, deserters from our ranks." In 1929, the *New Age* termed the San Patricios' part in the battle of Churubusco "another outstanding example of Roman Catholic disloyalty." Such charges prompted a deluge of letters to the War Department, which replied that no records existed showing either the nativ-

Nooses adjusted, one group of sentenced San Patricios was forced to watch the fall of Mexico City. As the Stars and Stripes rose, they cheered. Then the execution proceeded.

ity or the religion of the deserters. It is now well-established that the San Patricio Company was an ethnic and religious grab bag.

The Mexican view of the San Patricios was, of course, rather different from the American view. One Mexican account of the battle of Churubuso says: "Their deportment deserves the greatest eulogies, since all the time the attack lasted they sustained the fire with extraordinary courage. A great many of them fell in action; while those who survived, more unfortunate than their companions, suffered soon after a cruel death or horrible torments, improper in a civilized age, and from a people who aspire to the title of illustrious and humane." This statement notwithstanding, it should be pointed out that the Mexicans also executed deserters.

A monument to the San Patricios was erected in San Angel, now a suburb of Mexico City. It was in the form of a cross inscribed with three symbols: a gamecock, a pair of dice, and a skull and crossbones.

By Bennett Schiff

On a Roman hill scholars dwell in an estate of mind

The American Academy in Rome: a place to live, time to think and room to study and create, with no strings attached

To be in Rome on the brow of the Janiculum hill on an early winter's morning is to be reminded that the city is Eternal after all and that, oh yes, in some indefinable way, so are you.

It is a rather large thought, but yet not ponderous, this being an accommodating and spacious place to say the least, and the concept sings and decorates the day. You are standing at the railing of the Piazzale del Gianicolo (at one time a Garibaldi fortress since it commands the city across the Tiber) looking eastward over the great city resplendent and it is one of the most glorious views of all of Italy and, therefore, of all the world.

It probably was, you reflect, with the Italianate grandeur of the McKim, Mead and White mansion which houses the American Academy in Rome a five minute's stroll away, just such thoughts as these that got the building there in the first place. It makes a neat and comforting continuum, the Academy being put there because of such feelings, in order that such feelings may continue to be inspired. For the Academy is—and not at all in the sense of empire—an entirely respectful and admiring extension of America.

Its purpose is to absorb the tradition of classical creativity and knowledge and to increase the culture of the United States. And for 84 years now some quiet time spent at the Academy by a select number of the country's most creative and thoughtful people has had a widely reflective effect on our society at home: upon its architecture, its music, poetry and literature, painting and sculpture, its academic training in the classics and the other humanities. Which is to say that for four generations men and women who have spent time at the American Academy in Rome have been contributing in very substantial ways to that grain of any society—its arts and its learning—which establishes its lasting virtue and worth, in essence, its very nature and character.

It is impressive to consider some of the people who have lived at the Academy and worked in Rome:

In music the first three composers to be awarded the Rome Prize, the winning of which designates the recipient as a Fellow of the Academy (FAAR), were Howard Hanson, Leo Sowerby and Randall Thompson. Sowerby became professor of composition at the American Conservatory in Chicago; Hanson, director of the Eastman School of Music of the University of Rochester; Thompson, professor of music at Wellesley College and later at Harvard.

In 1921, Dean West of Princeton wrote of the Academy's Classical School: "We have furnished our universities with nearly 150 professors trained in the humanistic as opposed to the pedantic spirit. We have also trained a group of curators for museums and a fair number of gifted writers and critics."

Francis Henry Taylor, later to be director of New York's Metropolitan Museum of Art, was a visiting Fellow. John Walker was the Academy's resident associate in charge of the fine arts before becoming director of the National Gallery in Washington. Thornton Wilder wrote his important novel, *The Cabala*, while at the Academy.

After World War II, a program was established to bring people of prominence to the Academy to share their expertise with the Fellows. They included: Elizabeth Bowen, Archibald MacLeish, Barbara Kolb, Van Wyck Brooks, Aaron Copland, Samuel Barber, Robert Venturi, Edward Durell Stone, Louis Kahn, Donald Oenslager, Robert Penn Warren, Alfred Kazin, Philip Guston, Allen Tate. And it was the architects Wallace Harrison and Max Abramovitz who set up a special fund to enable foreign artists to visit and stay.

When one of the Academy's distinguished directors, Laurance Roberts, retired in 1960 he received a letter from a group of former Fellows and associates which said, in part, "If a list were composed of all the compositions played for the first time by American symphony orchestras in the last ten years, it is a modest guess that 75 percent of the composers would be found to have been guests of the Academy."

Bennett Schiff, a member of SMITHSONIAN'S *Board of Editors, is a former art critic and a lifelong admirer of Roman life and art.*

Portraits of some former Fellows added over the years form a suitable backdrop for the bar where, if you feel like it, you turn up for *cappuccino* in the morning or a drink later on, served by Patrizia Minto.

Photographs by Charles Eames and Pierre Boulat

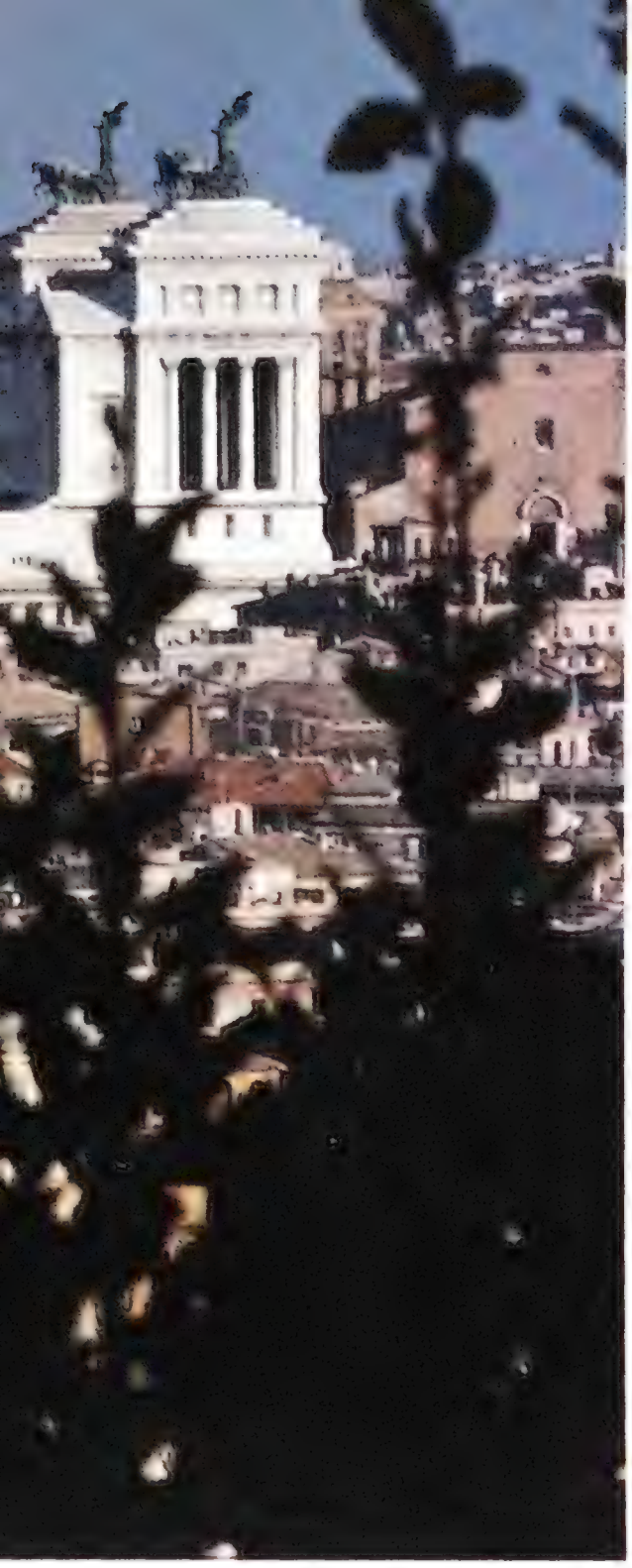
Charles Follen McKim, the Academy's founder, was of the eminent architectural firm of McKim, Mead and White. McKim moved easily within the halls of the mighty, having designed so many of them himself. Born in 1847 to a Quaker family in rural Chester County, Pennsylvania, he grew up with a high regard for learning and social responsibility. He spent a year at Harvard, attended the Beaux-Arts Academy in Paris, traveled in Europe and firmly decided that Rome was the center of civilization.

Back in the United States he worked at the Chicago World's Fair of 1893, along with John LaFarge, Augustus Saint-Gaudens, Frederick Law Olmsted and Daniel Chester French, under the leadership of the fair's chief architect, Daniel Burnham. "Do you realize," Saint-Gaudens once said of this group, in a remark not notable for modesty although it may be excused for its simple enthusiasm, "that this is the greatest meeting of artists since the fifteenth century?"

McKim was excited by the experience of working in the same environment with others who had similar passions and great talents. He knew of the French Academy housed in the outstandingly beautiful estate of Rome's Villa Medici, and knew that it provided a stimulating experience for visiting scholars and artists. Why not an American Academy in Rome?

Less than a year later, on March 31, 1894, McKim launched the idea at a dinner he gave for his partners, William Rutherford Mead and Stanford White (Mead used to say that his name was between McKim and White "to keep the two damned fools out of trouble") and three other members of the office.

His financial plan was simple: to persuade existing organizations with prize funds for study abroad to send their winners to an atelier in Rome. McKim went on to appeal to all of the country's schools of architecture, there being six at the time, to send their prize students to the new school he envisioned.



The view, looking eastward from the heights of the Janiculum hill, toward all of the splendor of Rome.

Nearby is the Academy building. At corners of garden there are four large, squarish adjuncts, spacious studios for sculptors.

By June 12, 1894 the new organization had $15,000 subscribed, enough to defray expenses for three years, costs being what they were in those simple days, and the Academy, then called the American School of Architecture in Rome, became a fact. To give an idea of the kind of clout it commanded, its committee on a plan of study included, in addition to some of the nation's leading architects, the heads of the fine arts and architecture departments of six universities: Harvard, the Massachusetts Institute of Technology, the University of Pennsylvania, Cornell, the University of Illinois and Columbia. On November 8 of that year eight rooms were found on the corner of Via del Condotti and Via Bocca di Leone and the Academy was under way. It had a staff of one, three Fellows in architecture and a guest student. Very quickly painters and sculptors became Fellows, and soon classicists as well. In time there came the poets, composers, writers and art historians, all of whom together form the two divisions of the Academy, the arts and the classics.

The young institution struggled along year after year with McKim prevailing on friends to donate money and digging into his own pocket when necessary (he was not a rich man, but comfortable) to keep things going. Eventually he was able to persuade nine donors to give $100,000 each, in return for which they would be designated Founders. There is some indication of McKim's persuasiveness apparent in the permanent list of Founders: J. P. Morgan, Henry Walters, William K. Vanderbilt, Henry C. Frick, Harvard College, John D. Rockefeller jr., Charles F. McKim (subscribed to in his name by friends after his death), J. P. Morgan jr., the Rockefeller Foundation and the Carnegie Corporation.

McKim had written to Mead, in 1902, "For the first time, let me tell you we have enough money in the bank to carry us not only through this year's but also next year's running expenses." It was a statement that

Architect, former dean and arts administrator, Academy President Bill Lacy in the billiard room.

Fellows gather, if they are so disposed, by the fire in the great lounge of the Academy building.

could not be made of the Academy's finances often during the 75 years that followed although Bill Lacy, the Academy's president, reporting at the end of his first year, was able to say that the organization was in the black "for the first time in many years."

Lacy came to the Academy in January 1977 after five productive and innovative years as director of the Architecture and Environmental Arts Program, National Endowment for the Arts. An architect himself, and former dean of the school of architecture at the University of Tennessee, Lacy has got the kind of background and access that the Academy can today use so well as it prepares to move back into the prominence it once held and which, somehow, faded in recent years.

There is, too, a new resident director at the Academy, the distinguished classicist John D'Arms, who took leave from his job as chairman of the classics department at the University of Michigan to head things in Rome. D'Arms has had a good deal of experience of the Academy, having been, at different times, classicist-in-residence, director of the summer session of the Classical School, and a trustee since 1973. He, like Lacy, has a nicely tuned sense of humor and a sharp eye for the practicalities of the mundane world of administration and finance. With Walker O. Cain (FAAR), head of the architectural firm which bears his name, and which is the lineal descendant of McKim, Mead and White, as chairman of the board, the Academy is today taking a fresh look at itself, and there are already indications that the accolade of the Rome Prize is again going to carry with it one of the highest distinctions the country can offer to its scholars and artists.

Rome Fellows are chosen by panels of eminent men and women, receive a monthly stipend, transportation, board and housing at the Academy, some money for travel in Europe, supplies, materials, studios and the use of a splendid library of 86,000 volumes, itself one of the notable libraries of Italy.

Some idea of the scale of the Academy, a grand neoclassical Italian Renaissance structure (built by the firm of McKim, Mead and White, naturally, but not actually dedicated until four years after McKim died in 1909), is indicated by the fact that the great library is tucked away in one wing of it.

The building has 12 double rooms, 24 single rooms, seven studies, 16 studios (some so sweeping that they are really halls) three one-bedroom apartments, one three-bedroom apartment, a dining room that is the closest thing in secular life to a clerical refectory (including one communal dining table running about 30 feet down the center of it), a truly baronial lounge (it is about 30 by 40 feet with a 35-foot ceiling and windows looking out on the Alban Hills, the light upon which is often pure gold), a billiard room of the kind early American millionaires considered standard,

The atmosphere is amiable, the company congenial, and the talk wings its way in all directions.

Rome residents, cellist Frances Marie Vitti, pianist Yvan Kikhashoff, entertain Fellows at a weekly concert.

a little bar, and more, not the least of which is the world's most agreeable staff. And yet, it is quiet in a suitably reflective way and as private as its residents choose it to be.

All through this, well, estate of the mind, there is the quiet talk of scholars drifting around, talking perhaps of third-century Roman portraits, a showing of Poussin at the Villa Medici, or a trip to Cosa, the Academy's famed archaeological dig in the Tuscan hills overlooking the sea some 90 miles north of Rome. A scholar walks through, his head filled, if you listen carefully, with the sound of clinking shards. The Fellows and residents are in jeans, boots, tweed jackets. It is all friendly enough, but not effusive. Coffee at 10 A.M. in the main lounge. Tea comes in the late afternoon. Lunch at 1. Dinner at 8. Breakfast in the bar at your convenience.

We are in the lounge; coffee time.

George Hartman, 41, of Washington, D.C., mid-career Fellow, spending six months at the Academy and having the time of his life. Hartman is very much an arrived architect, half of the firm of Hartman and Cox, architects in charge of the remodeling and addition of Washington's Folger Library, and of other notable buildings in Washington. "Twenty years ago when in Italy," he says, "I thought it was all very nice but now I've just come back from seeing a bunch of 400-year-old villas and how marvelous they are. One of the fine aspects of this is the break of time with an excellent library, buildings, gardens, villas and the opportunity to look very carefully at them, to draw them. My project is to see why we have so much trouble with modern architecture and why our own vocabulary is so poor. It's exciting to see just how good these people were. It's been a real revelation to me and I can see very clearly why contemporary architecture is so bleak, why it has the problems it has. It requires more background, more study and more collaboration with other arts. Palladian architecture was so coordinated with other arts. It never occurred to them not to

Paul Arthur Kubic and some of his work; small figures in wax will be cast; the dragon is welded metal.

do the gardens with the villas. It's reassuring to see how well things can be done, given time. You have to admire people like Palladio, Bramante."

Paul Arthur Kubic, 36, sculptor. A smiling man, Kubic doesn't talk much, very unusual these days for an artist. He has taught sculpture at the University of North Carolina, Humboldt State University and the Maryland Institute of Art. He is interested now in 14th-, 15th- and 16th-century altarpieces and carvings, and stories and myths illustrating human development symbolically. In his studio he is readying small wax pieces which he will cast in the little foundry the Academy has in its garden. The pieces are of fantastical animals and, think of it, of fallen angels. "The place is staggering," he says, smiling. And well you might think so, for he has one of the most impressive sculptor's studios to be found anywhere to work in; there are no demands other than his own, no students to meet, no schedules to keep, just time and the space and materials he needs.

Gareth Schmeling, 36, PhD, professor of classics at the University of Florida and recently named "Teacher of the Year" by the university's College of Arts and Sciences. He is working on an edition of a Latin text of *Apollonius of Tyre* and he is, as they say, *contento.* "This is a marvelous institution," he says. "There's a respect for knowledge for itself here. I know it sounds corny, but respect for learning for learning's sake. A piece of information is respected just because it is. That's so easy on the job in a university to forget about. And, a marvelous army of scholars comes through. It's leisure time to be used for thinking. When I first got here I felt disoriented: no schedules. And, no telephone. It's marvelous. A bit like walking in downtown New York and all of a sudden you're in a garden. That's what it's like here and putting it in Rome is a nice thing. It encourages each person to be a free scholar." A scholar in a state of exhilaration. That's a nice thing too.

Judith Silver, 27, painter, is staying on at the Academy as a Fellow for a second year through a grant by the Cafritz Foundation. She is in one of those grand, sweeping, skylit studios on the second floor. She has worked prodigiously in Rome. The walls are stacked with canvases. She works in painted collage, some of it huge for the medium, four-and-a-half by seven feet. "The old walls of Rome and Italy began to affect me," she says, "and now they are in my work."

Daniel Mark Epstein, 28, of Baltimore, a poet. He has published two acclaimed volumes of poetry and was nominated for the Academy Fellowship by the American Academy of Arts and Letters. "For one thing," he says, "it's the best working situation I've been in for a long time. Unlike a lot of poets I need to work every day. It's a full-time job for me. This is an opportunity to work on a long poem and have a year to complete it.

"I'm very influenced by the city, the power of the city. Because of the pressure of 2,000 years of history I'm getting a new perspective of the power of the individual. The other day we went to the roof of the Pantheon and looked down from the dome and that's what it's like being in Rome: a focus on Western civilization I never had before."

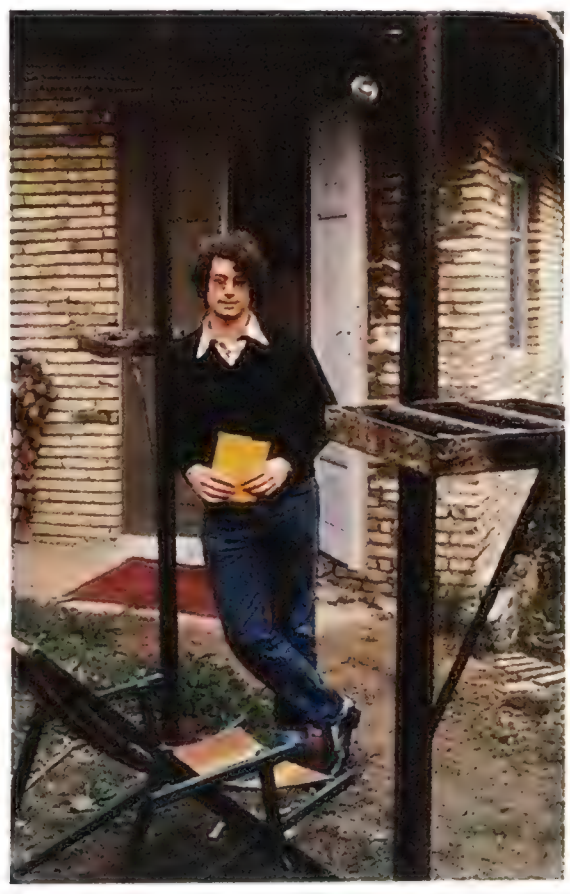
Epstein's studio, a rustic hut of brick, is built into the garden wall—put there in the early 16th century by Pope Leo X, a Medici, as a defense against the army of Charles V which, nevertheless, sacked Rome in 1527. Beneath it runs the famed Aurelian Wall built by the Emperor Aurelius between A.D. 271-275. The poet is almost dizzy with the beauty of the place. "I feel the vibrations and sparks that created Rome here," says Epstein, a poet in a state of exaltation. You wait for his next book.

John Holland Thow, 27, is a composer from Ventura, California. He had visited the Academy in 1973 while on a Fulbright from Harvard. "I got to know the Academy. I had a very rich yield. I learned so much visiting with the composer Leon Kirchner, who was in residence that year. I wanted to come back. I tried once and didn't make it. Last year I tried again and was very surprised to succeed. The competition is very intense." He is working on an orchestral piece which will be performed by the R.A.I. Radio Symphony of Rome, one of the best in Italy, which each year accords a concert to works by Academy Fellows and resident composers. "It's invaluable," says Thow, "it can't be gotten in the States. And, being in Rome you get an entire cycle of concerts and artists you don't get at home. Maybe just living in another culture is a valuable experience. That is, if you're going to get beneath the surface and not gripe about the mail being slow, which it is."

Thow's studio is in the almost unbelievably picturesque Casa Rustica, at one time an old inn, which sits in a corner of the Academy garden. There is a sloping, raftered roof, some old comfortable chairs, a draftsman's table spread with composer's ruled paper, a piano, and a warm composer's smile. "You can't imagine," Thow says, "what a luxury it is for a composer to have a place in which he can make all the noise he wants to and still be quiet." Whole suites of sound occur to you.

Simon Dinnerstein, 35, New York, painter. He says: "I don't think you could find a better setup for a painter. As soon as I came here I knew I wanted to stay longer. A year didn't begin to seem enough." Dinnerstein, whose work has received warm approbation from John Russell of the *New York Times* and who shows at the Staempfli Gallery in New York, is now in his second year at the Academy.

"In terms of my work, which is figurative, being in Rome is continuing a tradition. Of course, in a sense,



Three Fellows of the Academy: John Holland Thow, above, composer, on the steps of his studio in the Casa Rustica; classicist Gareth Schmeling at work in the big library and, right, at the entrance of his private studio, built firmly into the Academy wall, the poet Daniel Mark Epstein.

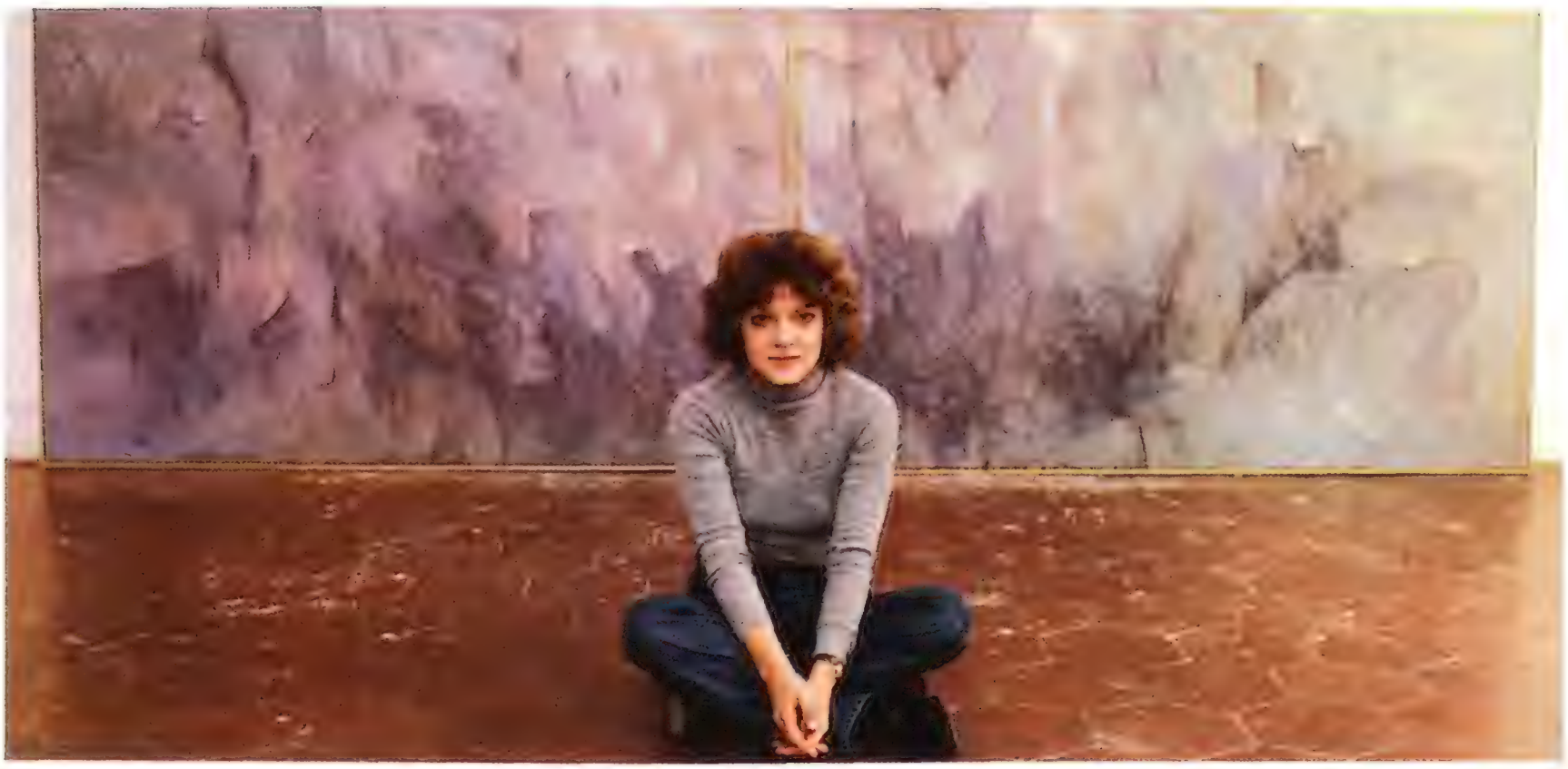
it's intimidating. You are given studio space, materials, your responsibility is to come up with something. I get a terrific amount of work done here. I don't work quickly so this has been a very productive time for me. The only studio I've ever seen which reminds me of this space was that of Daniel Chester French in Stockbridge. In terms of light, I don't think I've ever seen a gray day here; even in the rain." Of course, in terms of art, isn't this where light was born?

"I want," says Academy President Lacy, "the former distinction of the Rome Prize, and the eminence of the American Academy in Rome, to be restored." He is, considering what you have seen and what you have come to feel about the place, well on his way.

It is evening and you've been standing on that esplanade bathing your eyes and spirit in that Rome there before you, a beneficence. You think, with regard to that persistent and nagging question which comes up all the time in discussions of the Academy, why should it be located in Rome, couldn't it be done somewhere else as well?

Perhaps the answer might be, well, yes, in many other places which have rich heritages of their own and of value to Americans. Which is to say that the American experience in Rome as transmuted over the years into the substance of American cultural history has become so valuable that, one thinks, there should be not just an Academy in Rome but others in Tokyo, New Delhi, Peking. Is it too much to suggest an American Academy in Moscow? A fantasy, of course, given the indispensable need for freedom which scholars and artists must have. But if it were possible, such an Academy might do more for the United States than, say, the American Embassy there.

We are speaking now of long-range things, the things which remain after the movers and shakers and noisemakers are forgotten. The kinds of things which, in this case, the American Academy in Rome has been serving for more than 80 years now. Think of it, there are beautiful Americans in Rome, too.



Judith Silver, who works in small and delicate collage, also creates sweeping large works, as in her *Antipodal Landscape*, 30 by four feet.

At right, artist Simon Dinnerstein, now in his second year in Rome, poses with his daughter and an Italian model before paintings for which they posed.

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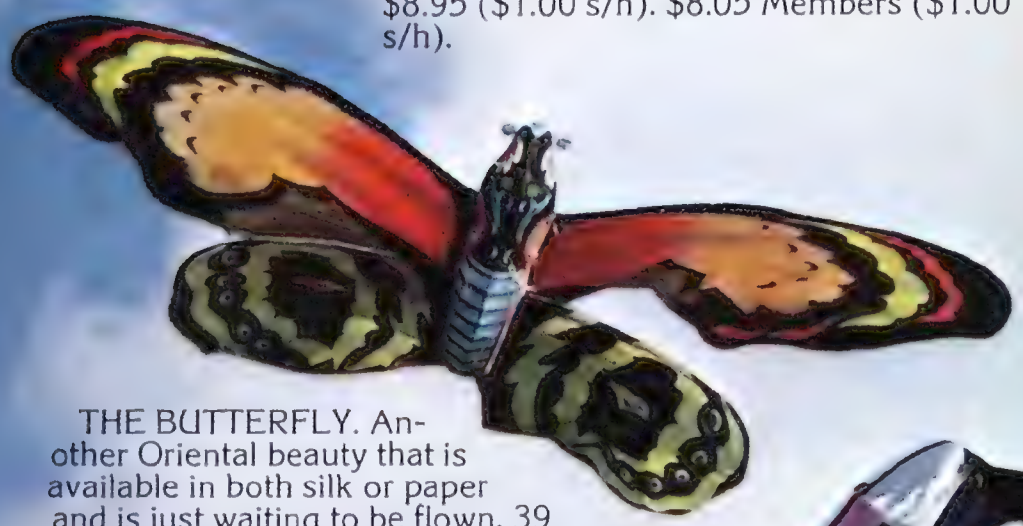

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SMITHSONIAN INSTITUTION

With Montaillou on the hillside in background, a farm woman rakes hay in her family field.

Few young people have stayed in neighborhood, but families stubbornly hang on to property.

By Robert Wernick

A lustful French cleric of the 1300s, an era of heresy

Defying the dread Inquisition, his remote village strayed far away from the faith; a new book recounts a lurid investigation

Montaillou is a tiny, quiet village, much like many others in provincial France. It is in the roughest and most inaccessible part of the backward, out-of-the-way Ariège department in the south. The village has existed at least since the time of Charlemagne, but it has never played any part in history, never been on any beaten track, never had a famous son, and its contribution to the national economy has always been close to zero. "The end of the Earth," one of its older inhabitants calls it, with a certain affection.

Now this end of the Earth has suddenly awakened to find itself famous. Curious tourists make long detours over winding mountain roads to inspect it. French people know all about Montaillou, more details of its daily life than of any other similar community anywhere.

Not the daily life of today: what they know is the daily life of Montaillou in the first quarter of the 14th century. For this is the subject of a surprise best seller in France, a 628-page, immensely learned volume by Emmanuel Le Roy Ladurie, professor of history at the prestigious Collège de France.

The book, *Montaillou, village occitan,* is written in a vivid, sprightly style, but with its formidable apparatus of footnotes, bibliography, cross-references to works of sociology and cultural anthropology, it hardly seems popular reading. The publishing house of Éditions Gallimard certainly didn't consider it as such; they brought it out with no fanfare while devoting the bulk of their advertising budget to something surefire, the memoirs of Muhammad Ali. To their astonishment, the heavy historical work on Montaillou was snapped up so quickly that bookstores everywhere in France ran out of copies and called for more. More than 130,000 copies of this thick, expensive volume have been sold. It will be published in English here in May by George Braziller, Inc., as *Montaillou: The Promised Land of Error.*

The secret of its success is that it deals in rich detail with the scandalous, omniverous sexual behavior of a heretical local priest in the early 1300s. Everyone in Montaillou has at least heard of the book and is pleased by the publicity it has brought the village. But with centuries of mountain-folk caution and craftiness behind them, they are not eager to express an opinion. "I haven't had time to read it yet," is what they generally say; "my mother-in-law has the copy right now and I'll get around to it later."

The Montaillou the tourists see is of course very different from the Montaillou of six-and-a-half centuries ago. I recently accompanied Le Roy Ladurie on a visit to the village to see what, if anything, had remained the same.

How is it that we know so much about the Montaillou of old? The answer lies in the character of the man who made Le Roy Ladurie's book possible, in fact provided him with all his basic source material. The man was Jacques Fournier, from 1317 to 1326 Bishop of Pamiers; Montaillou was one of the outlying parishes in his diocese. As Bishop, he set up the local "office" of the Inquisition, which gave him powers to ask questions and extract answers in ways not available to historians or journalists today. He had the right to use physical torture, but he preferred not to. He depended on his zeal for the truth, his unerring eye for deception and his own brilliant, forceful, narrow mind.

Though he rose very high in the world—he later became Pope under the name of Benedict XII and began the construction of the great palace of the Popes at Avignon, the seat of the church from 1309 to 1377—he was a man of rather humble origins, with distant cousins who tilled the soil around Montaillou itself. And he had a complete understanding of the devious dodges of the peasant mentality. He makes the truth come out of us like lambs from their mothers, said the poor souls who passed through his cross-examinations.

Pamiers, in the lowlands at the foot of the Pyrenees, many years before had been a center of the Cathar or Albigensian creed. This was a sect which turned official Catholic doctrine upside down. It held that the

Robert Wernick, who wrote about Versailles palace in the March 1977 SMITHSONIAN, *visited Montaillou with Professor Ladurie, the village's biographer.*

Someone told her you may put off coming to the Orient for another year.

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In varied light from a stained-glass window, the author, Le Roy Ladurie, sits in a rough pew in rebuilt church of the present Montaillou.

Lord of this world was not God but Satan, and that all material things, including, preeminently, the Catholic Church itself, were the work of the devil.

A human being, born in filth, could escape all this and go straight to Heaven if he led a life of utmost purity, without lies, without sex, without eating meat. This was only within the reach of a few devoted ascetic souls, called *parfaits* or *bonshommes,* whose lives could serve as examples to ordinary mortals. For the latter it sufficed to protect the *bonshommes* and to receive, when dying, a *consolamentum* or blessing which was a one-way ticket to Paradise. Meanwhile, they could do pretty much as they liked.

A further advantage of this creed was that it offered salvation at no cost, while the Catholic Church insisted—sending the police if necessary—on taking a portion of the local crops and flocks as tithes. Little wonder that the pious, simple, thrifty souls of Montaillou were converted almost in toto to the heretical faith. So was their lecherous parish priest, Pierre Clergue, who did not stop hearing their confessions or collecting their tithes for all that.

This was a daring and dangerous thing to do, for the Inquisition, which had been created on purpose to stamp out the Cathar movement and other heresies, was always in the background with its dungeons and racks and thumbscrews and heaps of fagots. Fortunately for the heretics in Montaillou, the Inquisitors were living miles away in comfort in Pamiers and Carcassonne. And Montaillou was so small and unimportant, so hard to get to over wretched mule tracks, it was easily overlooked. Besides, the Inquisition's official source of information in the village was Father Pierre Clergue, who had every reason to see that they did not get accurate information.

One day in 1308, however, the Inquisition swooped down and arrested every soul in Montaillou over the age of 13 and took them off to Carcassonne for questioning. But the zeal of the investigators did not last long, most of the heretics were released, and nothing more was done until Jacques Fournier, the future Pope, came on the scene in 1317.

From 1318 until 1326 he devoted an extraordinary amount of his valuable time, 370 working days in all, ferreting out the sinful thoughts and deeds of Montaillou and its neighbor villages. No

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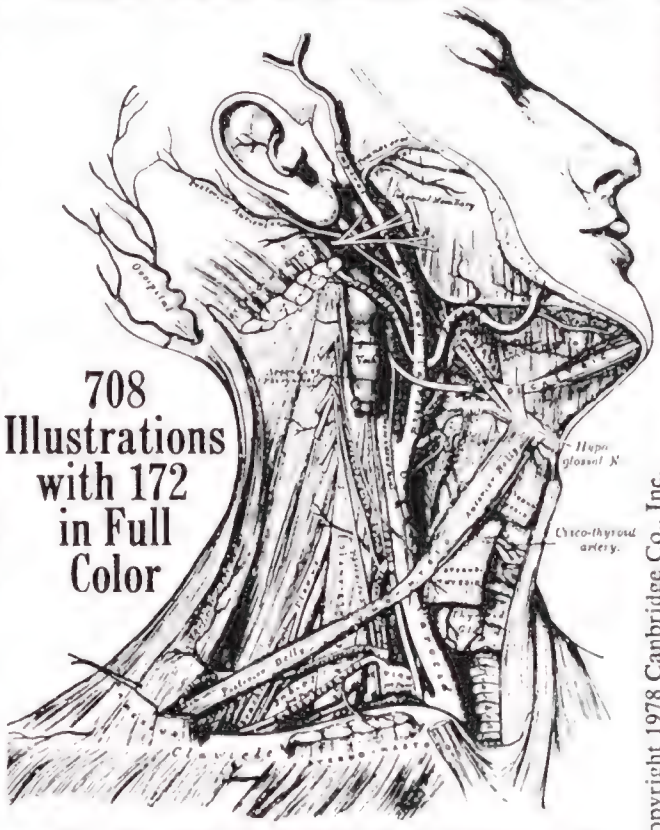

Fig. 283—Surgical anatomy of the arteries of the neck, showing the carotid and subclavian arteries.

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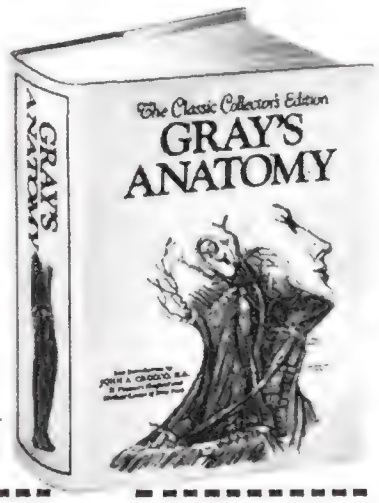

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matter to him that Montaillou was a wretchedly backward place, where there were no wheeled vehicles, where money hardly circulated, where illiterate peasants owned handkerchief-sized plots which they worked with primitive plows.

It was Bishop Fournier's duty to punish their sins and if possible save their souls, and to that end he personally questioned them hour after hour, day after day, smoked out their evasions, caught them up in every contradiction, compared every line of their testimony with that of their neighbors. Questions and answers were in *occitan*, which was the language of the country—the common people would not speak French in this region till centuries later when the public school and universal military service forced them to learn the official tongue of Paris. Translated into Latin by scribes, the testimony filled three huge volumes which Jacques Fournier was proud to take with him to Avignon. Ladurie learned of them almost a decade ago, and his researches grew into his own book.

Unrelieved bitterness and torment to the poor villagers, these interrogatories are a source of pure joy to modern historians and readers. For they come as close as anything can to satisfying the curiosity at the heart of our interest in

citizen, ex-mayor and retired horse dealer. He and his wife have a modern kitchen.

history: what was life really like in the old days? What did people do all their livelong days and nights, what did they talk about, what did they think? Bishop Fournier's aim was a narrow one, to track down heresy. But in the course of his questioning, the track led back and forth across the whole physical, economic, spiritual life of Montaillou. The Bishop was methodical and thorough; in Le Roy Ladurie's phrase he was a supercop, a 14th-century Inspector Maigret patiently filling in every detail of the background in order to reconstruct the crime.

So as he proceeds in his laborious way, we learn all that a modern economist, sociologist, novelist or any curious inquirer would want to know about Montaillou. We learn that it contained 250 persons more or less (they often didn't bother to count infants, especially female ones), grouped into about 40 *ostals* or houses, each one a fiercely independent family domain with its few rude pieces of furniture, its little fractions of land on the hillside terraces, its poultry and sheep and bony cattle. Some *ostals* even had a second story, though in all the people shared their space with their animals. But there was a kind of rough equality among them. There was no class conflict in Montaillou; everyone had to work hard. There was no mistress

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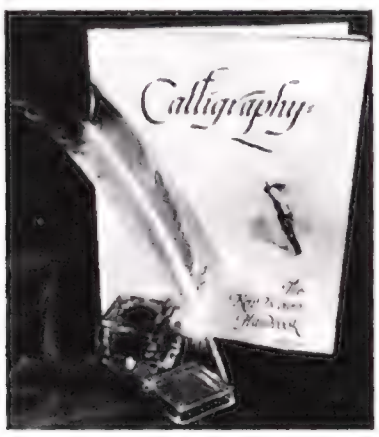

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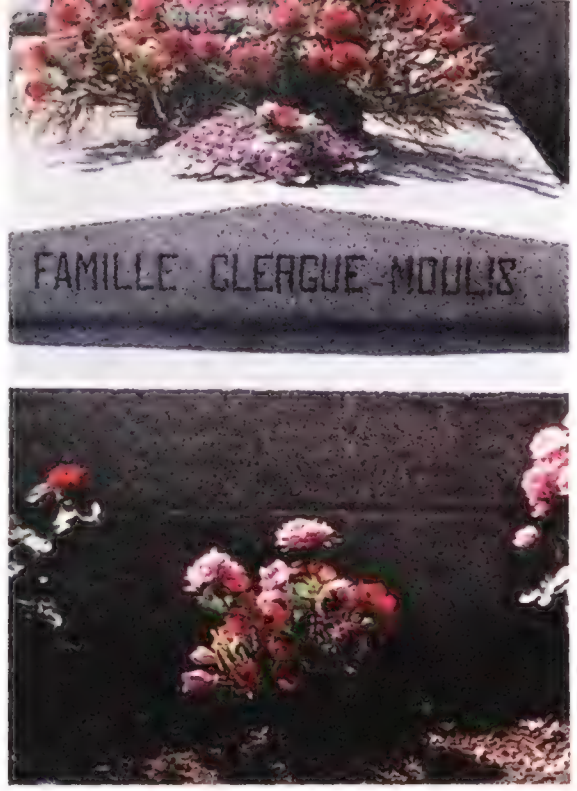

A Clergue tombstone in family plot is in village cemetery near the church.

of an *ostal* so proud that she didn't walk down to the well with her pitcher on her head, along with all the other housewives; and they all gossiped together and exchanged useful information on such things as how to avoid unwanted babies. What conflicts there were, and they were many and fierce, were between rival *ostals* jockeying for power or scheming to revenge ancient wrongs.

The village grew what it basically needed in the way of food, and the flax of its fields and the wool of its sheep kept its people clothed. Wool and wood, and fish from the local streams, could be exchanged for salt and the rare luxuries like wine and olive oil that the villagers desired. Most local transactions were done by barter. What money there was was hoarded in the immemorial way of the French peasantry for use on special occasions, as when Bernard Clergue, the bailiff, produced the enormous sum of 14,000 *sous* in a vain effort to bribe his brother, Father Pierre, out of the dungeons of the Inquisition.

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We hear everyone's secrets. Here is Vuissane Testanière, servant girl in the house of Bernard Belot, when Arnaud

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Vital, boarding in the same house, tries to rape her: "Are you not ashamed? You forget that I am mistress to your first cousin Bernard Belot, and that I have children by him." It was enough to shut Arnaud up on that occasion.

The same Vuissane suspects one evening that heretics are sleeping in a new room Bernard has built. She slips out into the yard, climbs a dung heap and spies her master's brother conversing with two men, one of them the heretic Guillaume Authié. Suddenly a passerby asks what she is doing in the yard. She explains that she was looking for the pad she wears on her head when she goes to fetch water from the well. When she tells the story years later, Bishop Fournier has his testimony that a *bonhomme* was being sheltered by Bernard Belot, and we have a clearer picture of life and architecture in old Montaillou.

Everyone in the village was relatively poor (though nobody starved, everyone was reasonably healthy), but the Clergues were less poor than the others. And almost all of Pierre's waking thoughts were directed toward the enlarging of his *ostal*, his home, the aggrandizement of the House of Clergue. A secret heretic himself, he consolidated his power by protecting his fellow heretics from the Inquisition. At the same time, he was not above abasing rival families by denouncing them to the Inquisition.

He was a small man, ambitious, loquacious, with a lusty appetite for power and a still more heroic one for women. No woman in the village, or in nearby Aix-les-Thermes when he went there for

Chateau of Béatrice de Planissoles—
she was once the lover of Father Clergue.

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Unlike Father Clergue's, St. Anthony's temptations, one of which appears in this 15th-century illumination, were resisted successfully by the saint.

a mineral bath, was exempt from his advances. "I love you more than any woman in the world," he would say right off, and generally that was enough. If it weren't he would say, "I'll put you in the leeks" (a modern Frenchman would say "the cabbages"), meaning: I'll get you in big trouble. This was no idle threat in his mouth; when a woman of the Maurs family accused him (correctly) of being a heretic, he had his brother the bailiff cut her tongue out. What with one approach or the other, he generally had his way. The names of 12 of his concubines appear in Jacques Fournier's interrogatories, and there were surely more. (The husbands looked the other way because they feared his power, or were grateful to him for saving them from imprisonment and worse.)

Most striking of his mistresses was Béatrice de Planissoles, a noble lady, widow of the *chatelain* who had managed the castle of Montaillou for the absentee owner, the Count of Foix. "I prefer you to any other woman in the world," he said to her in church one day, where she had come to make her confession; and before the summer was out she had yielded to him, and they loved each other tenderly for two years, until she went off to find another husband. Neither that husband nor another young priest she took into her bed later could ever make her forget the virile Pierre Clergue's gentleness and air of authority.

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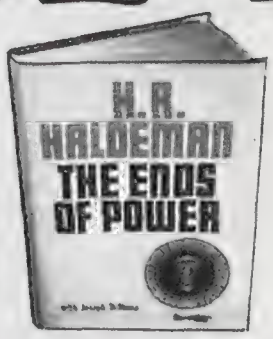

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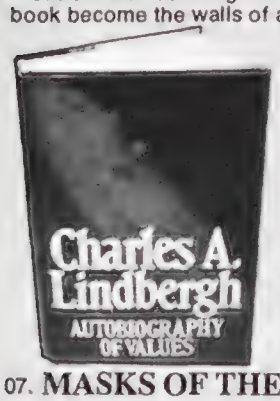

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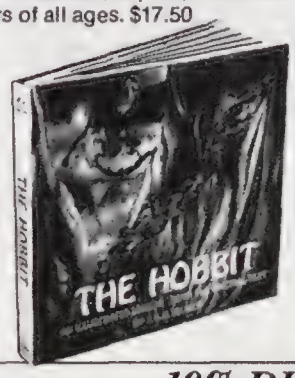

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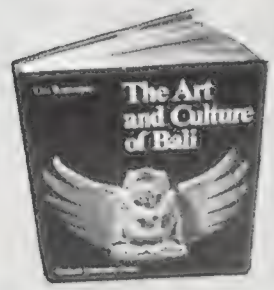

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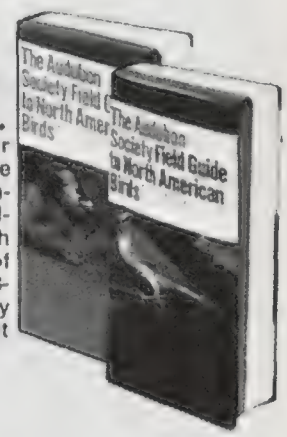

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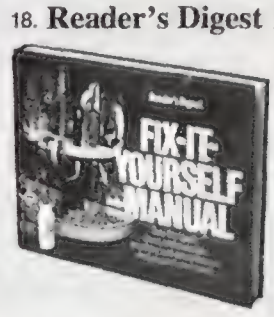

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In the medieval times of Father Clergue sex—as now, and always— was fraught

walls; how once when she was delousing him by the fire (a mark of affection and deference) he explained his unorthodox theories of incest—brothers should marry sisters, he said; in that way the fortunes of the House of Clergue would not have been frittered away providing dowries for its daughters.

There is only one record of failure in the career of this clerical Don Juan. He went to a woman named Alazaïs Fauré one day and said that her young niece Raymonde was known to be unhappy because her husband could not perform his marital duties with her. Bring Raymonde to me, he said; I will deflower her and afterwards everything will go well between her and her husband. "You arrange things for yourself," replied Alazaïs Fauré sharply. "Aren't you already satisfied with having possessed two women in my family, myself and my sister Raymonde?" The younger Raymonde was terrified when she heard of the priest's advances, and ran home to her father.

Raymonde's fears were exceptional. More typical was the reaction of the little farm girl Grazide Rives, who was 14 when the priest seduced her on a haystack on a bright summer day, and who prattled with pleasure about it years later to the Bishop: "With Pierre Clergue, I liked it. And so it could not displease God. It was not a sin. . . . It does not please me anymore . . . now, if he knew me carnally, I should think it a sin."

with symbolism. Here the Holy Trinity (left) sends a child to bless a union.

At an opposite pole from Pierre Clergue stands the sturdy, simple figure of the shepherd Pierre Maury. He was as devoted to his family as the priest was. But, unlike Father Clergue, Pierre Maury had no use for worldly riches. He led a dog's life, as his friends often told him, drenched in autumn, and almost freezing as he drove his sheep back and forth over the perilous Pyrenean passes. He could own no more goods than he could carry with him. But he was free in his fashion, he loved the clear air of the mountains, with no obligations but to his sheep and the wide circle of friends he had picked up on his travels. I would die if I had to stay all summer in the lowlands, he would say. Wiry, tireless and fearless, he was always ready to face risk and discomfort to do what had to be done, whether it was rescuing his sister from a brutal husband or bringing supplies by night to a fugitive *bonhomme* in the trackless mountains.

Trying to avoid the Inquisition and its agents, Pierre Maury went to live for a while with another refugee down in Catalonia, a *parfait* named Guillaume Bélibaste to whom he became strongly attached. Also living with Bélibaste was a woman named Raymonde—chastely, the *parfait* said. Unfortunately for Bélibaste's reputation, the Bishop collected the testimony of one Blanche Marty, who came in unexpectedly one day and "found them in bed, Guillaume with his

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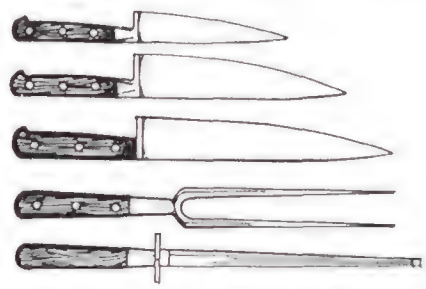

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knees bent as if he was about to know Raymonde carnally. . . . When Guillaume . . . noticed me, he cried, 'you bastard, you just interrupted an act of the Holy Church.'" Pierre Maury had always avoided marriage, but one fine day Bélibaste cajoled and bullied him into marrying Raymonde. Shortly afterward, he persuaded him to divorce her. And shortly after that, Raymonde gave birth to a child, obviously Bélibaste's, but Pierre Maury could not believe evil of his holy mentor and went on living dutifully under his spiritual guidance.

Relations between Bélibaste and Raymonde were ambiguous to begin with. The *parfait* had to get into bed with her, he told his disciples, so that people would think he was a good husband. But as a holy Cathar, with no lust in his heart or anywhere else, he made a point, unlike his contemporaries, who often slept nude, of going to bed in his underclothes.

Along with dramatic figures like these, the registry of Jacques Fournier brings to life a whole gallery of mountain people. There is Bernard Clergue the bailiff, crying "Dead is my god, dead is my ruler," when he learns of his brother's death in prison. There is Pierre Azéma, a distant relative of Bishop Fournier, trying to use the episcopal connection to arrange an advantageous marriage for his daughter. There is all the interlocking network of families—Belots, Benets, Maurys, Rives—jockeying for position, struggling to keep alive, feeding heretic preachers on the sly, quarreling, dying. Some like Guillaume Bélibaste were burned at the stake. Some like Pierre Clergue and his brother the bailiff were shut up in irons in the dungeons of the Inquisition and died of ill-treatment there. Others were allowed to return home, but their possessions were confiscated and for the rest of their lives they had to wear yellow crosses on their clothes, a mark of infamy as the yellow star was for the Jews.

Despite all these punishments, despite the burning of homes and the confiscation of property that accompanied them, Montaillou did not die. Its population dropped by half as a result of the Black Death and the wars of the 14th century, but the tough old peasant stock held on to its fields. Centuries went by and nothing much was changed. At the eve of the first World War, in the memory of people still living, it remained an isolated, largely self-sufficient village. It raised its own food, its sons married village girls or

Alain Fayette, a "foreigner" from Brittany, uses newfangled barbed wire to enclose his dairy cows; the townsfolk are mistrustful of such progressivism.

Devout Mme Durand, mayor's wife, rings church bells thrice daily, a tradition.

found brides at the yearly fairs in nearby towns. "Backward?" says one of the older inhabitants, "We were so backward we didn't have an alcoholic." "Oh, no," adds his wife. "Wine was expensive. We only had wine on three holidays. It was like apples—they were brought in by donkey and had to be hidden from the children."

The outer world was beating at the door, however. In the old days of the 14th century the mountains shut in the world of Montaillou. Children who did not inherit land had no choice but to go to work as shepherds or servant girls for neighboring farmers. In the 19th century, enterprising young men from Montaillou discovered they could get jobs in Africa. Many came back with their savings when they retired—they are known locally as *les Sénégalais*—and the walls are still decorated with photographs of moustached men with pith helmets and rifles proudly posed by the corpses of leopards.

By 1914 life inside the houses of Montaillou was still centered around the kitchen. There were about the same number of inhabitants as in the 14th century, still grouped into the tight-knit structure of families we find in the records of Bishop Fournier. Le Roy Ladurie sees their pastoral customs basically unchanged from Neolithic times many thousands of years ago, when farming and animal raising were first introduced to Europe. They survived Bishop Fournier as they were to survive the Hundred Years War, the Black Death, the Wars of Religion, famine and depression. It took the shock of modern life, with its easy

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Life in the village has no appeal for young people; the work is too hard, there are no distractions, you can't make money working the crazy quilt of old family plots. Like so many villages in France and the world today, Montaillou has become a community of the old. There are fewer than 25 year-round residents today, and only two of them are under 55 years of age.

One is a young man named Alain Fayette, a native of Brittany and therefore considered a "foreigner" in these parts. He raises dairy cows, which has not always been seen with a friendly eye by the old-timers. "It's the Wild West," he says. "I thought they were going to lynch me when I put up barbed-wire fences around the fields I rent. For centuries, men had been going out leaning on sticks to watch their cows, and they didn't see why I had to come and change the old ways." (His is the only commercial enterprise in town.)

Those old ways shrivel away, year by year. Mme Durand, the wife of the mayor, still rings the church bells three times a day—morning Angelus, noontime, evening Angelus—because she says a village without bells would be wholly dead. The church itself is locked up except for rare occasions like funerals, and there is no more a parish priest at Montaillou. Neither is there a school—it was closed for lack of pupils 15 years ago—

gathered by firesides to share local lore, or to get to know future spouses.

nor a café, nor even a grocery store; a truck with provisions drives into the village square a couple of times a week. Augustin Bécabeil, the blacksmith, has just about closed down his forge, though from time to time he may shoe a cow for one of his neighbors, the little family plots planted in oats or potatoes still being plowed by cows. Until recently, some of the old traditions used to be kept alive by the old-fashioned institution of the *veillée* or evening visit: people dropping in on their neighbors to gossip and eat and reminisce about the games and songs and courtships of the old *veillées*. It was at such get-togethers in the long winter evenings that most of the people living in Montaillou today got to know their spouses; it was during their relaxed talk that each generation passed on to the next the old sayings and maxims, and the history of the village. The *veillées* too are gone, says Mme Durand, now that everyone has a TV set.

The Clergue family itself, after 650 years, is still the leading family in Montaillou. There is another Pierre Clergue in town; he was mayor for many years, and it was only fitting that his should have been the first home in Montaillou to install color TV. He also owned the last horse in town, and his grandchildren looked forward to riding it when they came for their vacations last August. But a buyer turned up in July, and Clergue, a horse trader before he was mayor, could not resist the pleasure of a good deal.

Just as in the 14th century, the inhabitants of Montaillou speak *occitan* among

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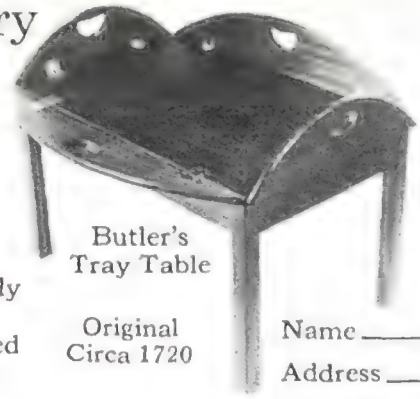

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themselves. The sons and daughters who went off to the universities or to jobs in the big cities may have chosen to forget it. But the grandchildren are feeling stirrings of pride in their roots. "Grandma," they say when they arrive for their school vacations, "how do you say *cow* in *patois*?"

There are no more heretics in Montaillou, unless you count another foreigner, a Parisian psychoanalyst who is rumored to be both a Cathar and a Buddhist and who has built a villa just below the ruins of the castle. The spirit of independence, the distrust of distant authority that helped turn the villagers into rebels against the church centuries ago, are still very much alive. Everyone today says he is a Socialist. There are no revolutionary connotations, in fact there is no interest in politics whatever except at election time when the old family rivalries prove to be just as deep and sharp as ever. But it gives them the chance to express their disapproval of foreign interference.

When the present generation has cashed its last old-age pension check, it is likely that the village will be no more than a collection of secondary homes—shut up through the long snowy winters unless some one starts a ski resort there the way they have at the neighboring village of Camurac. The homes, however, will belong to the old families, the Clergues and the rest. The young people may come back for their own retirement. At all events, they will hold on to their property. Their roots run deep, and there seems every reason to believe those roots will still be firmly planted in Montaillou in the centuries to come.

The Inquisitor who brought Father Clergue to heel, and to death, was Bishop Jacques Fournier, here sculpted when Pope Benedict XII. He reigned at Avignon, then the papal seat, building a palace there.

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Book reviews

Letters to Friends, Family, and Editors
by Franz Kafka
Translated by Richard and Clara Winston (Schocken Books, $24.50)

Even as a young man of 20, Franz Kafka had a premonition of the personal hell he would later endure. To a friend he wrote: "And if I were to cast myself down before you and weep and tell you, what more would you know about me than you know about hell when someone tells you it is hot and dreadful." As full of foreboding as Dante's inscription etched on the gates of the Inferno, these words could well serve as an introduction to the magnificent fourth volume of Kafka's correspondence, *Letters to Friends, Family, and Editors.*

The three earlier volumes encompassed Kafka's letters to a close friend, to his fiancée and to his father. This newest volume chronicles the writer's lingering and woeful passage into death from tuberculosis in 1924, when Kafka was but 41. The correspondence collected here charts his grim consumptive journey with the sustained intensity of an epistolary novel—just the kind of nightmarish fiction Kafka might have created.

The writer himself emerges as an archetypal Kafkaesque figure, tortured and isolated. His body—like that of Gregor in *The Metamorphosis*—undergoes a hideous change as his sickness gradually breaks him. Without having committed a crime, he is apprehended by the bacilli of his disease, and, like the condemned man of *In the Penal Colony,* is strapped and buckled to a remarkable apparatus of torture: his own diseased carcass. This volume of correspondence fulfills Kafka's dictum that a book should "affect us like a disaster . . . like the death of someone we loved more than ourselves . . . like a suicide. A book must be the axe for the frozen sea inside us."

Indeed, like his fiction, Kafka's letters are axes that chip away the protective security of the familiar world. His desk Kafka describes as having two "horrible wooden spikes" which pummel and pierce his knees whenever he writes anything extraordinary: "I could show you the black-and-blue marks." To Max Brod, his devoted lifelong friend and editor, to whom most of the letters are addressed, he confesses: "Tomorrow I am treating myself to having my stomach pumped; I have a feeling that disgusting things will come out." He feels, he tells Brod, "like a fist with the nails pressing into the flesh. . . ." Even the ghastly horrors of Kafka's last moments are caught in the book's concluding section, "Conversation Slips," which documents the dying man's final words, written because he was too feeble to speak.

Many letters—such as Kafka's descriptions of the nightly invasions of mice into his sanatorium room—can stand in their own right as short stories. And, as one might expect, dreams recur throughout the letters—bizarre, grotesque visions given form by one of the most tormented imaginations of the 20th century.

Not all of the letters, however, delineate the fear and trembling of a man on the brink of disaster. As Kafka proclaims, the stake to which he was tied did occasionally blossom into a "green tree"; thus, the letters also show him as a sensitive, humorous, sympathetic human being, one who delighted in friends, in travel, in the gifts of life. He thanks Oskar Baum for "the raspberry syrup, especially, pure pleasure from the first drop to the last." His letters to a female patient are at once playful, avuncular and wise. Tactfully he gives advice to the wife of his best friend on their collapsing marriage. To his sister he writes a series of letters on how to explain the facts of life to her child.

Kafka readers will treasure such insights into the man, for his fiction reveals precious little about his daily life. Born in Prague in 1883, of German-Jewish Bohemian parents, Kafka spent much of his adult life employed in a semigovernmental position with the Worker's Accident Insurance Institute or on leave in various European sanatoriums.

These letters, then, are like messages from the underground, from the dark side of the moon, presenting aspects of Kafka that would have died with his friends. We meet alternately the many sides of the writer: Kafka the artist, friend, son, father figure, marriage counselor, literary critic, insurance official—and, especially in the later years, suffering victim. "I was in somewhat of the situation of this flower beside me, which is not wholly healthy, and though it lifts its head to the sun—who wouldn't do that?—is full of secret griefs because of the painful processes in its roots and in its sap; something has happened there, is happening still. . . ."

Franz Kafka, man of letters

Letters to Friends, Family, and Editors is detailed but never cluttered; its notes and chronology are always helpful and unobtrusive, clear and never cumbersomely erudite. Because it presents a full portrait of Kafka—the sun in his life as well as the secret griefs—it is a worthy addition to the three volumes of letters already published and a significant contribution to Kafka scholarship.

—Paul Piazza
Author and critic

In the Deserts of This Earth
Uwe George
(Harcourt Brace Jovanovich, $14.95)

"We . . . learned to regard it as an antechamber to hell," Uwe George recalls. "The sense that there was no way to escape the heat often brought us to the verge of despair. . . . We seemed to be surrounded by a colorless ring of flame." For three five-month periods he and his wife lived in a tiny old fort in the northwestern Sahara where, after dark, a sound as of someone gobbling potato chips came from beneath their bed as a desert fox and two desert hedgehogs—pets—ate their way through an army of cockroaches. The Georges' sufferings were justified, at least for science, by the discoveries they made about the sandgrouse, an extraordinary bird: the flocks post a sentry-on-the-wing to warn of approaching falcons, the female finds a nesting site above a porous stone (cooler than denser surrounding stones) so the eggs will escape cooking, and the male saturates the feathers of its underside at a drinking hole to bring water to the young.

George has other fascinating desert dwellers for us: lizards that swim in the sand and locusts that exactly resemble pebbles coated "with the desert's lacquer of manganese hydroxide," which is itself a "microforest" of "algae, lichens, bacteria and fungi." He shows us how the horned viper of the Sahara and the sidewinder rattlesnake of our Southwest have independently developed a style of locomotion with the advantages of the wheel. He and his wife unearth spadefoot toads of the California-Arizona desert that have dug themselves two feet down to await a soaking rain that may be years away.

Born in Germany in 1940, the author has spent the years of his maturity studying and living in deserts. From this tutelage he has emerged with the theme that the deserts he has known and the arid, dust-swept bleakness of Mars are what inescapably lie ahead for the Earth. It is partly because of his preoccupation with this vision that his book is not as satisfying as his qualifications and writing skills should have made it. It tells us at once too much and too little—too much of the origins of our planet and its life and almost nothing of the deserts of Asia and South America; and its treatment of desert flora and fauna is incomplete. Man's

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An in-depth illustrated seminar and tour program of major horticultural sites in and around Washington, D.C., with an emphasis on the current approach to design and maintenance in today's economy, coordinated by the Director of the Office of Horticulture, Smithsonian Institution. Participants review historical as well as contemporary approaches to horticulture with activities at the Smithsonian Institution, the U.S. Botanic Gardens, the National Arboretum, Dumbarton Oaks and Mount Vernon. A day is spent at the world-renowned DuPont estates of Longwood Gardens and Winterthur Museum Gardens. Keynote speakers include the horticulturist or landscape superintendent of these unique sites.

Mineral Sciences at the Smithsonian: The Earth, Moon and Meteorites—June 11-16

Designed by the professional staff of the National Museum of Natural History as an introduction to the historical and current research studies on gems, minerals, meteorites, rocks and lunar samples, this seminar incorporates a survey of the basic principles of geology, mineralogy and petrology. Demonstrations and comprehensive tours of the current exhibitions, including the world-famous gem collection, supplement the lecture program. Individual study at the museum's new Naturalist Center and a day-long geology field trip to Shenandoah National Park combine practical and theoretical experience.

A Look at Modern Sculpture—June 18-23

In three years, the Hirshhorn Museum and Sculpture Garden has become known in the United States and abroad for the depth and excellence of its collections. Its 19th- and 20th-century sculpture gives an especially comprehensive view of the growth of modern sculpture from Rodin's melancholy *Burghers of Calais* to the playful mobiles of Alexander Calder and beyond. Through lectures, tours and films given by the museum's professional staff, participants become acquainted with the works of great 19th- and 20th-century sculptors including Degas, Matisse, Picasso, Moore and David Smith. Special emphasis is given to one of the museum's most important exhibitions to date—*"The Noble Buyer": John Quinn, Patron of the Avant-Garde.*

China: A Cultural History—June 18-23

This seminar deals with the history of Chinese civilization from its beginnings in prehistorical times to the China of today. The major emphasis is on Chinese intellectual tradition, art and architecture as they developed in the cultural setting of the dynastic periods from the second millennium B.C. to the 20th century. Discussions cover the great philosophical and religious traditions that dominated Chinese life—Confucianism, Taoism and Buddhism—and their reflection in art and architecture, ending with the question of the survival of this cultural tradition in our time. Illustrated lectures, focusing on the outstanding collection of the Freer Gallery of Art, are supplemented by recent slides of major Chinese cities and museums. A tour of the Freer collection is included.

Please send requests for information on registration fees, accommodations and course content by seminar title to:

Selected Studies, National Associate Program, A & I 1280
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contribution to the spread of deserts and what may be done to check and reverse it—subjects dismissed in few words by the author—would have a more immediate interest than the desiccation and deoxygenation of the planet hundreds of millions of years hence, particularly as this prospect is predicated on theories that all geologists might not accept. The lack of bibliography and index contributes to an impression of the book as rather an inward-turning performance. So do the mistakes such as any writer may make but a qualified second would have caught. (The water level of the oceans in the ice ages dropped not just dozens but hundreds of feet. Camels, elephants and horses disappeared in North America not at the outset of the ice ages, 2.5 million years ago, but at their end, some 10,000 years ago. George does not make this clear. And then, that handsome falcon in plate 19 surely cannot be a peregrine: a saker or lanner, perhaps?)

Withal, *In the Deserts of This Earth* provides some absorbing reading. The first chapter, on the nature and types of deserts, is splendid and demonstrates the author's sensitivity of perception, as in passages where he contrasts the feeling of devastation and chaos produced by landscapes in stony deserts with the sense of well-being and comfort derived from the rhythmical forms of dunes, hostile to life as they are. Both in words and in his color photographs he evokes unforgettable scenes, such as in his reference to the humps and heads of camels riding above a sandstorm "like ducks drifting in the current of a river." A beautifully designed creature, the camel—an instance of what George legitimately calls "nature's intelligence," of which the desert affords some of the most striking examples.

—*Charlton Ogburn*
Author, *The Adventure of Birds, The Continent in Our Hands*

No Man Alone: A Neurosurgeon's Life
Wilder Penfield
(Little, Brown, $12.50)

In Wilder Penfield's operating room, patients who had their brains exposed during operations for epilepsy suddenly relived various episodes from their pasts as he stimulated certain spots in their cortices. During a quarter of a century, the famed neurosurgeon operated on more than a thousand patients in the Montreal Neurological Institute, which he had founded. He mapped out specific areas of the brain which are involved in the motor control of legs, arms, lips and tongue, as well as in the control of memory and speech. He was probably the leading brain explorer of all time.

Don't look for his major discoveries in this book, however. It stops just short of them, in 1934, when he succeeded in opening the institute which made them possible. Instead of being Penfield's "long-awaited autobiography," as the blurb promises, *No Man Alone* is only the story of his first 40 years (he died in 1976, at the age of 85).

Nevertheless, it paints a fascinating portrait of a strong-willed, independent scientist who knew exactly what he wanted, and got it, thereby opening the way to a new understanding of the human brain.

Part of his strength came from an utterly devoted mother who decided when he was 13 that he would become a Rhodes scholar, which he did. From the time he left home in 1909, she preserved his weekly letters, in which he described his work

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To order—send check or money order payable to *Smithsonian Institution* to: **Kin & Communities,** Smithsonian Institution P.O. Box 1641, Washington, D.C. 20013. $7.50 plus 50¢ postage & handling (Smithsonian Associates & non-profit organizations—$6.75 plus 50¢)

and his hopes in somewhat stilted, old-fashioned language. She also edited and typed them, continuing this labor of love until her death in 1935, and giving him the basis for this book.

"I had to find a way of understanding what the brain was doing, and *how* it did it," he wrote. "I could operate, thus laying bare the brain, and I did so always with a certain reverence . . . but I stood before the functioning brain of man as if before the great sphinx, and was dumb. . . . I had no clues. . . ."

His purpose was to find the causes of epilepsy and other ailments. To do so, he decided, he would have to unite brain surgery and neurology with brain research. He wanted the new findings from science to influence the medical and surgical treatment offered to patients, and the surgical experience to provide new leads for research—a revolutionary concept at a time when neurosurgeons could do little more than remove some tumors. Throughout the world, in those days, basic scientists worked in isolation from neurologists, psychiatrists or neurosurgeons. But Penfield had a knack for spotting important research, wherever it might be.

In 1924, defying much ridicule, Penfield left his post as neurosurgeon at New York's Presbyterian Hospital to go to Spain, where the physiologist Ramon y Cajal had developed a new method of staining brain cells. While Cajal worked with normal animal brains, Penfield wanted to use his techniques to examine the cells of diseased human brains, which had never been done before. Later on he exhibited similar independence when he went to Germany to work with Otfrid Foerster, a surgeon who operated on epileptic patients. Penfield's newly acquired Spanish techniques showed why Foerster's operations succeeded, and what could be done to improve them.

Finally Penfield felt ready to operate on the brains of patients who suffered from epilepsy. He began to draw up plans for an institute where leading scientists and physicians from different disciplines could focus their talents on the brain, in line with these operations.

Much of this book revolves about his efforts to create such a Mecca. Though personally reserved and unemotional, Penfield had a passionate conviction that such an institute was essential for the future of brain research. He became an effective politician, attracted large bequests from the relatives of patients, drew the attention of the Rockefeller Foundation, and achieved his goal. From then on, he was free to pursue his extraordinary research just the way he wanted it. He also galvanized a large number of other researchers, who are still carrying on his work on the brain today.

—*Maya Pines*
Author of *The Brain Changers*

The Zapping of America: Microwaves, Their Deadly Risk, and the Cover-up
Paul Brodeur
(W. W. Norton, $11.95)

High-frequency radio signals called microwaves permeate our environment. They are used in everything from sophisticated radar and electronic weaponry to television via satellite, to microwave ovens and automatic garage-door openers. Yet, as *The Zapping of America* makes clear, no one knows for sure what effects this invisible radiation may have on public health. "We are living," writes Brodeur, "under an electronic Sword of Damocles."

In this disquieting book, Brodeur, a staff writer for *The New Yorker,* exposes the "conspiracy of silence" that he thinks surrounds microwave radiation.

The Department of Defense—virtually the sole sponsor of microwave research in this country—and the U.S. electronics industry vigorously defend a standard for safe human exposure adopted in 1958 which recognizes hazards only at the high intensities required to heat living tissue.

The Soviet occupational safety standard, also adopted in 1958, appears to be a thousand times more stringent, but it is difficult to verify USSR reports. As early as 1933, Soviet scientists investigating complaints from radar workers began to document neurological and physiological effects from low-intensity microwaves, including dizziness, emotional instability, slowed heart rates and shifts in white blood-cell counts. These reports, and similar findings by a few American scientists, were ignored or discredited by the Defense Department. Then, in 1962, a mysterious, low-intensity microwave signal was discovered beaming into the American Embassy in Moscow.

Though the defense establishment

feared the Russians might be trying to injure or perhaps alter the behavior of American diplomats, the existence of the "Moscow Signal" remained a closely kept secret until a decade later. In 1976, word that the signal was active again made headlines around the world.

A string of unusual medical problems soon alarmed the embassy staff. Ambassador Walter J. Stoessel jr. suffered a strange ailment and was reassigned to Germany. Serious chromosome damage was detected in several former embassy employees, as well as 16 cases of breast cancer, and 64 of 213 personnel tested showed abnormally high white blood-cell counts. Zbigniew Brzezinski, President Carter's national security adviser, told a reporter that the cancer rate in the Moscow embassy was the highest in the world. These revelations prompted the State Department—though it insisted there was no proven connection to the Moscow Signal—to install aluminum window screens at the embassy to deflect incoming radiation.

That response, Brodeur observes, put the State Department in the position of shielding a few hundred Americans in Moscow from radiation levels to which millions of Americans are being exposed every day.

The intensity of "electronic smog" in many American cities today exceeds natural radiation levels millions of times over. Researchers for the Environmental Protection Agency have measured radiation exceeding the apparent Soviet standard on the upper floors of the Sears Tower in Chicago and New York's Pan Am Building, among other locations. High levels were also found by the National Institute of Occupational Safety and Health in the New York Times Building, where measurements were taken after two young operators of video-display terminals developed cataracts. The population exposed also includes microwave technicians, households with faulty microwave ovens and those who live near powerful radar installations, satellite transmitting stations and radio and television broadcasting towers.

Brodeur skillfully illuminates the medical and technical details of the microwave controversy and conducts a tour of the military's evolving generation of radiation weapons. Yet he feels that his warning may be too late. Definitive research on low-level microwave risks will take years; meanwhile, Brodeur claims, protecting the exposed population would involve enormous expense, could upset the machinery of our national defense systems and, undoubtedly, would pose tangled legal questions of liability for microwave injuries.

And certainly it is possible that an American public, enamored of television and wearied by continuing revelations of health hazards, will choose to live with its microwaves. Indeed, in urban areas this may be the only choice.

Among scientists themselves, the controversy about microwaves is intense. Some feel that we are unnecessarily alarmed; others feel that the danger is real. But the lesson of Brodeur's reporting is clear. "In order to protect their health and well-being," he writes, "the citizens of a constitutional democracy obviously have either to be informed, or to inform themselves about health hazards, for only when people are informed about the hazards can they insist that protective measures be taken."

—*Stuart Rohrer*
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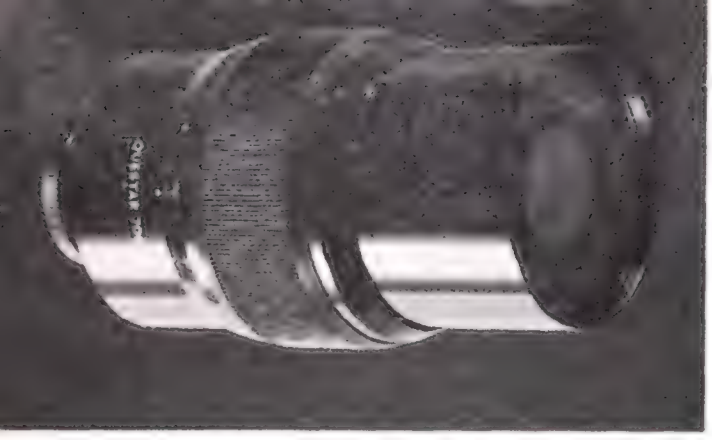

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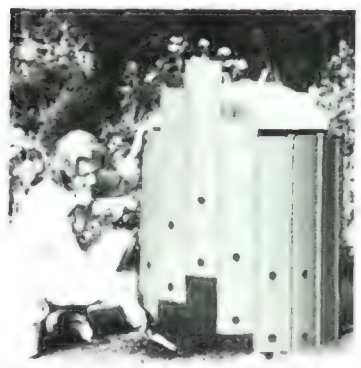

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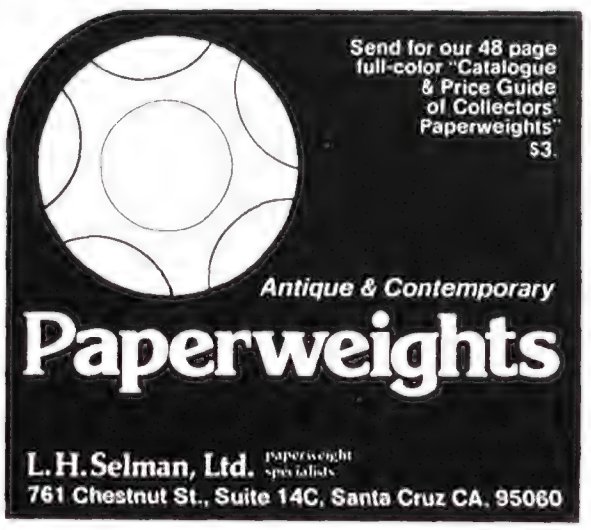
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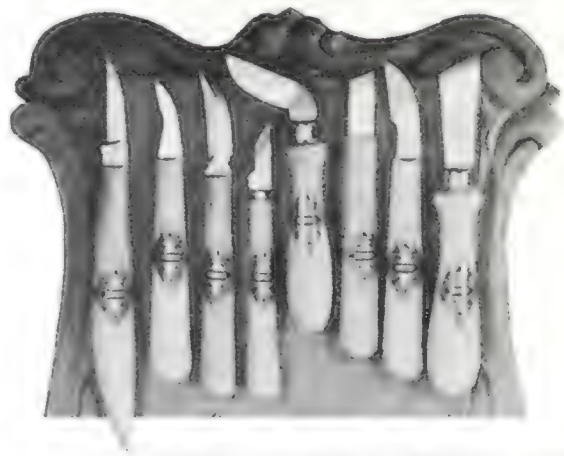

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Smithsonian highlights

March Events

Come Fly a Kite
Join in the Smithsonian's annual kite-flying party March 18, west side of the Washington Monument, at 10 A.M.

Musical Spring Week
Listen for the sweet tunes escaping the Museum of History and Technology during Easter week, concerts to chase winter.

Europe in the Seventies:
Aspects of Recent Art
The Hirshhorn Museum and Sculpture Garden presents a major, full-scale exhibition of avant-garde European art of this decade. The exhibition focuses entirely on art that has broken with traditional esthetics and concerns itself with contemporary ideas or procedures. Seven European countries are represented by 23 artists in this show which opens on March 16 and continues through May 7 (see picture, at right).

The Museum of Drawers
Five hundred artists, sculptors and architects have contributed to a self-contained exhibition of miniatures that will be visiting the Cooper-Hewitt Museum in New York City from March 21-May 7.

Attilio Salemme: Inhabitant of a Dream
This exhibition of 50 works by an American artist, who painted for only 12 years yet developed a unique classic style, opens at the National Collection of Fine Arts on March 3.

Maria Martinez:
Five Generations of Potters
The Renwick Gallery presents 115 pots, water jars, bowls and plates, and the tools of the American Indian potter. Included in the show, which runs from March 31 through August 13, are pots made by the famous 96-year-old potter Maria Martinez and members of her family.

Continuing Events

Hirshhorn Museum Film Series
The free film program features "Films by Artist-Filmmakers" on Thursday and Friday nights at 8 P.M.

National Air and Space Museum
The museum's popular film *To Fly* is shown in the theater on the first floor at 45-minute intervals beginning at 10:30 A.M. daily.

Division of Performing Arts
and Musical Instruments
- Victorian Ballroom Dancing will be the order of the evening at the Renwick March 5 at 6 P.M.
- Echoes of the Marlboro Music Festival will be heard on March 11 in Baird Auditorium, Museum of Natural History at 5:30 P.M.
- Ran Blake: Music of the Third Stream combines jazz with other forms, in the Hirshhorn Auditorium March 12, 6 P.M.
- Quadro Hotteterre performs in the Hall of Musical Instruments in the Museum of History and Technology on March 20 at 8:30 P.M.
- The Cantilena Chamber Players appear at Hirshhorn, March 23 at 8 P.M.
- Music for America's Popular Instruments, part of a series, in the Hall of Musical Instruments on March 27, at 8:30 P.M.
- The Malmo Percussion Ensemble appears at Hirshhorn, March 31 at 8 P.M.

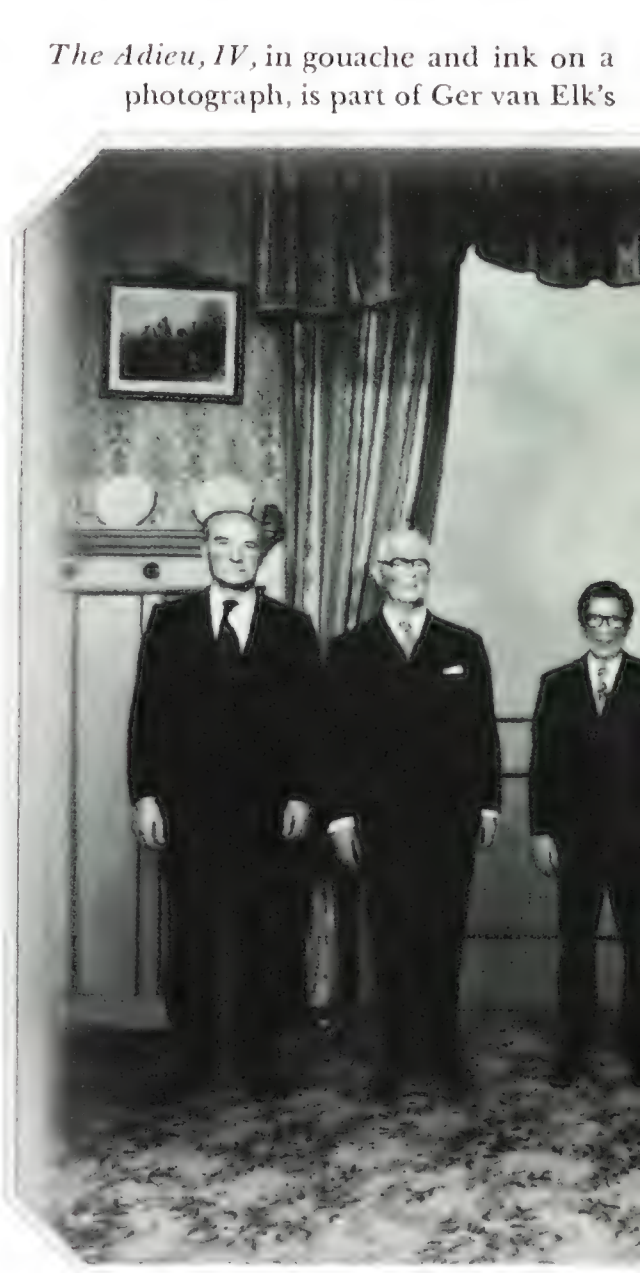
Musical Weekend in May
The Seventh Annual Musical Weekend in Washington, sponsored by the Division of Musical Instruments and the Friends of Music at the Smithsonian, will be held May 12, 13 and 14. Reservations are being accepted for this event, which opens with cocktails and dinner in the historic Smithsonian castle, followed by a performance of the New York City Opera.

Hotel accommodations for two nights and meals are included. For information, write: Musical Weekend, Room 4123, Museum of History and Technology, Washington, D.C. 20560.

Regional Programs

Triangle Area, North Carolina
The North Carolina State Museum of Natural History and the North Carolina Department of Cultural Resources are cosponsoring this visit by the Smithsonian National Associates, from March 11 through 19. Events scheduled for the Triangle Area include:
- The Smithsonian Chamber Players, directed by James Weaver, perform baroque and classical music on antique instruments and conduct workshops on instrument making.
- Lynn Bondurant, former education officer, National Air and Space Museum, explores ideas for space stations in a series of young people's workshops.
- Marc Pachter, historian, National Portrait Gallery, discusses the observations of foreign visitors in a lecture entitled "Abroad in America: Visitors to the New Nation 1776-1914."
- Edward P. Lawson of the Hirshhorn Museum presents an illustrated lecture on the impact of French Impressionism on American art.

Louisville, Kentucky
From March 29 through April 8 a taste



The Adieu, IV, in gouache and ink on a photograph, is part of Ger van Elk's

of the Smithsonian Institution will be available in Louisville, cosponsored by the Filson Club, J. B. Speed Art Museum, the Junior Art Gallery, Inc., Junior League of Louisville and the Museum of Natural History and Science. Events scheduled for Louisville include:

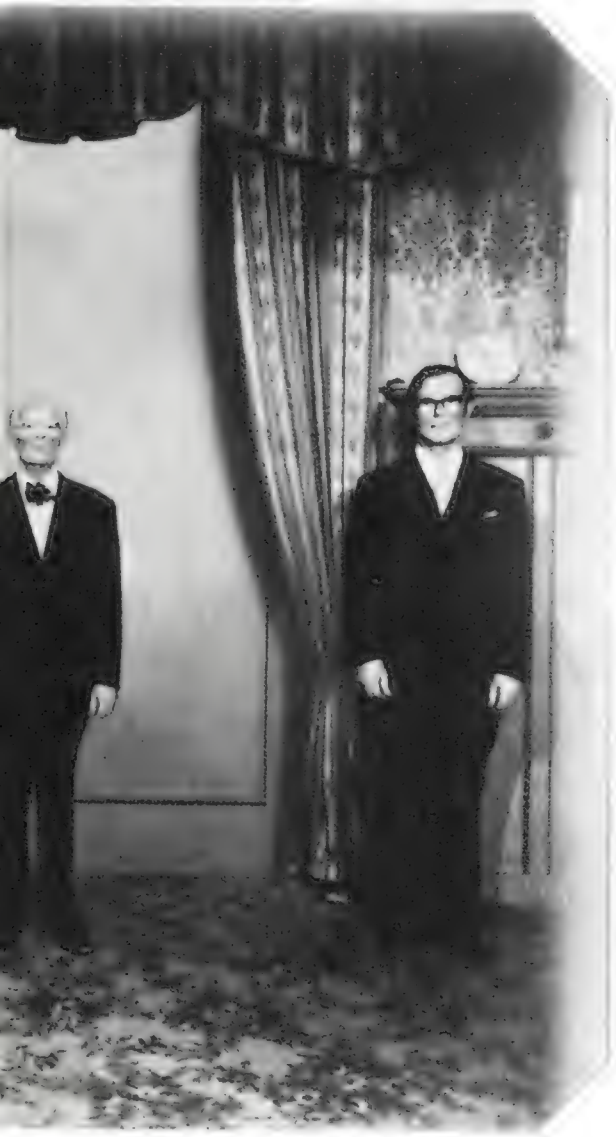
- The Smithsonian Chamber Players, historian Marc Pachter and Edward P. Lawson (see description for regional activities in the Triangle Area).
- Kjell B. Sandved, Smithsonian photographer and filmmaker, narrates his film on insect behavior and conducts photo-technique sessions.

Smithsonian Institution Traveling Exhibition Service

SITES has been organizing and distributing exhibitions in the fields of art, science and history for 25 years. For information about a show, write: Eileen Harakal, Smithsonian Institution, Washington, D.C. 20560, or call (202) 381-6631.

- Baltimore, Maryland—"Black Women:

Missing Person Series in a Hirshhorn show of modern European art.



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Exploring the World with the Smithsonian

For both the seasoned and would-be traveler, the Smithsonian has developed a travel program to meet a variety of tastes and budgets. In order to accommodate the increasing growth and interests of Smithsonian Associates, the tour programs have expanded, bringing travelers to places reflecting the Institution's interests.

Three types of trips are available, Charter, Domestic and Study, each with its distinct character. Foreign Study Tours provide small groups with culturally oriented, specialized trips, under the guidance of museum curators or experts in respective fields. Foreign Charter Tours, consisting of several small groups under the leadership of skilled guides and interpreters, are lower in cost, combine study, discovery and vacation. Domestic Tours offer specialized guidance and expertise generally unavailable to persons traveling on their own.

Foreign Charter Tours

Mayan Mexico: The Yucatán Peninsula—November 10-22 or December 2-14: A complete tour of the extraordinary Mayan ruins of the Yucatán. (Originates in Mérida.)

Guatemala—November 1-11 or November 22-December 2: In the company of an archaeologist, visit Tikal, the monumental Mayan city of the Petén jungle; Copán, a Mayan site deep in Honduras; plus the ruins of Quiriguá, El Baúl and La Democracia. (Originates in Guatemala City.)

Scotland*—September 25-October 9: Edinburgh and beyond—a program of walking tours and special visits in Edinburgh: castles, abbeys, battlefields, archaeological sites, plus incomparable scenic beauties of rugged mountain glens and rollings hillsides through the Highlands and Lowlands of Scotland.

Italy*—May 1-15: Explore the ruined grandeur of ancient Rome, the city's Renaissance churches and her baroque palaces and fountains. An eight-day program in Rome with museum seminars, walking tours and visits to ancient palaces and churches is followed by five-day excursions either to Florence, Orvieto and Viterbo; to Venice, Ravenna and Padua or to Naples, Pompeii and Capri.

Paris and Provence *—May 15-29 or September 4-18: Paris plus Avignon, Arles, Nîmes and Aix-en-Provence: museum seminars at the Louvre and the new Pompidou center; walking tours of the islands of the Seine; excursions to the Loire region, Chartres or Reims.

New Zealand and Fiji—November 17-December 5: Departing Los Angeles, this tour includes Mt. Cook, Te Anau and Milford Sound, plus Auckland, Rotorua, Wellington and Christchurch. Included will be talks on New Zealand's natural history, Maori heritage, parliament, plus a home visit. Brief rest stop at Fiji before return flight to the West Coast.

Low cost of tours includes first-class hotels, most meals, sightseeing, lectures, theater tickets and air fare. *Optional predeparture course will be available. Write Smithsonian Associates Travel Program, A&I 1278, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635 for details.

Domestic Study Tours

Chicago—May 10-14: Discover the architectural treasures of this vibrant city with walking tours and lectures by the Chicago Architecture Foundation: visit the Art Institute of Chicago and the theater.

Shenandoah Mountains—June 3-10: Study the geology, archaeology, natural and social history of these beautiful Virginia mountains. Tour originates in Washington with an orientation talk at the Smithsonian.

Arts and Crafts of the Southwest—June 23-July 2: Discover the influences of the Indian, Anglo and Spanish cultures on traditional and modern arts and crafts of New Mexico, through lectures, craft demonstrations, museum and gallery visits.

High Sierra Camping—July 15-24: Explore California's Sierra Nevada by four-wheel drive vehicle; learn how the bristlecone pine has survived as the oldest living thing. Spectacular scenery for hikers.

Desolation and Gray Canyons—July 23-August 2, September 29-October 9 or October 10-20: White-water trip for the adventurous; explore the geology, wildlife, and Indian and outlaw history of Utah's Green River.

Wind River Mountains—July 29-August 6: A horseback trip into the land of mountain men. Camp at 10,000 feet among turquoise lakes and high-meadow wild flowers.

Williamsburg Family Weekend—August 10-13: A repeat of our popular program for children ages 6 through 14 (and their parents) to learn about 18th-century life through participation in special tours and Colonial crafts.

Grand Canyon—August 18-28 or August 25-September 4: An exciting raft trip through the Grand Canyon with emphasis on the ecology and history of the Colorado River.

Winterthur and the Brandywine Valley—August 13-20: Focusing on architecture, furnishings and decorative arts, visit the world-renowned collections at Delaware's Winterthur Museum. Explore the Brandywine Valley and the 18th-century restored towns of Odessa and New Castle.

Washington "Anytime" Weekend: Choose any weekend to visit the nation's capital and enjoy a special tour of the original Smithsonian building, spend two nights at Loew's L'Enfant Plaza Hotel close to the Mall, and see other sights in Washington by Tourmobile. Reservations and payments must be received at least ten days prior to arrival date ($59.95, double occupancy).

For information, write Smithsonian Associates Travel Program, A&I 1278, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5635.

Foreign Study Tours

Gods and Gardens in the Western Mediterranean—April 29-May 15: Cruise on MTS *Argonaut* from Rome to Lisbon, visiting Roman and medieval centers of civilization in northern Italy and France, Barcelona's museums and architecture, Moorish Spain and Tangier. The guest lecturer will be A. Hyatt Mayor, Curator Emeritus, Print Department, Metropolitan Museum of Art.

Thomas Jefferson in England and France—July 9-30: His travels are retraced, with emphasis on country houses and gardens he admired; led by Professor Frederick Nichols of Charlottesville.

Iraq and Iran—October 30-November 25: Fly from New York to London, visit Mesopotamian collection in the British Museum, then to Iraq for Baghdad, Babylon, Ur, Nineveh and historic sites. In Iran, visit Tehran, Shiraz, Persepolis and Isfahan. Return via London to New York.

For detailed information, write: Miss Bliss Schumann, Foreign Study Tours, S.I. 123, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5520.

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Achievement Against the Odds" can be seen at the Peale Museum from March 18 through April 16.

- Coldwater, Michigan—"22 Polish Textile Artists" opens at Tibbets Opera Foundation and Arts Council—March 11 through April 9.
- Joplin, Missouri—"World Print Competition 77" appears at Spiza Art Center March 11 through April 9.
- Elko, Nevada—"And Now a Message . . . A Century of American Advertising 1830-1930" shows off the history of the ad, at the Northeastern Nevada Museum, March 11 through April 9.

Radio Smithsonian

In March watch for listings in your area of Smithsonian radio productions:

- The week of March 5—"The 1977 Festival of American Folklife, Part II," highlighting the people and music of last summer's festival.
- The week of March 12—"Splendors of Nature," a reminder of the intrinsic beauty of natural objects.
- The week of March 19—"Animals in Art," presents a discussion with Kjell Sandved, Smithsonian filmmaker.
- The week of March 26—"An Evening of Duets," offers Mozart and Brahms.

When Visiting the Smithsonian

Members are invited to register with the Associates receptionist in the original Smithsonian Building—the old red castle on the Mall. Here, between 10 A.M. and 4 P.M. daily, members may receive special orientation materials to ensure a more enjoyable visit. Misplaced membership cards will be duplicated upon presentation of a SMITHSONIAN magazine label. To aid in pretrip planning, members are advised that parking on the Mall is limited. Write or phone for an information packet: Associates Reception Center, Smithsonian Institution, Washington, D.C. 20560; (202) 381-6264.

Members Dining Room

The Court, the Associates dining facility, is located in the Museum of Natural History. A buffet luncheon is served seven days a week from 11 A.M. to 3 P.M., priced at $3.95 for adults and $2.95 for children. A hearty breakfast is served weekends only, 8:30 to 10 A.M., priced at $2.95 for adults and $1.95 for children.

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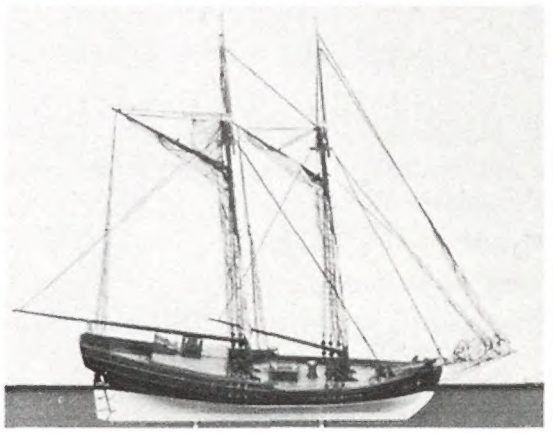

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This dialect writer vants yure sampathy

*By Robert Traver**

All writing is hard enough, heaven knows, but the writing of dialect that is both authentic and readable must be among the hardest of the lot. I'd like to give one small example of the many goblins that hover over the writing of any dialect, even the simplest.

Olaf, a railroad locomotive engineer nearing retirement, was called upon to take a bow and say a few words at the annual union picnic, which he did, popping up and floridly carrying on at sedative length about the glories of democracy and the incomparable advantages of an American free enterprise system that had enabled him, just a poor Swedish immigrant, to get where he had. About the time the harried chairman was wondering just what or whom to bang with his gavel, Olaf concluded his peroration as follows: "Fack iss, brudders, twenty-sex year ago ven Ay com' to dis country Ay coon't say engen-neer—an' now Ay are vun! Tank you." (Translated: "The fact is, brothers, that 26 years ago when I came to this country, I couldn't say engineer—and now I am one! Thank you.")

My dialect version of what Olaf said beautifully illustrates the problems and pitfalls abounding in all dialect writing. For what I have him saying is as phony as a three-dollar bill, and I know it; no genuine old-country Swede would or could possibly carry on that way. Yet if I wrote it the way he'd really say it probably not one reader in a hundred would have the foggiest notion of what in hell either of us was driving at.

First of all, an old imported Swede like Olaf wouldn't *speak* his piece; he'd *sing* it—and how is the toiling dialect writer going to drop his pen and grab a baton and write in arias? Not only would Olaf sing it, but he'd do so with a well-nigh uncapturable lilt, including lightning changes in pitch and intonation and cadence that would tax a Stokowski. Moreover, there'd be a variance in stress and emphasis between certain words.

Perhaps the most frustrating thing about all this is that while I can at this moment plainly *hear* Olaf saying what he said, and like to fancy I can fiendishly *orally imitate* him saying it, yet for the life of me I can't quite *write* him saying it —and, final irony, the harder I try, the faster I'm apt to lose anyone trying to *read* him saying it. To prove it I'll ignore readership for the moment and honestly try to write it the way Olaf himself would likely say it. But first a paragraph or two to pave the way for that trauma.

Passing Olaf's opening three words with a grudging grade of B-minus, the first real stumbling-block is my phrase "twenty-sex year ago." Olaf would far more likely say "twenta-sax yar agoo"—whereupon I'd promptly lose 26 readers. Take his next phrase: "com' to dis country Ay coon't. . . ." His "com' " (come) would sound more like "comb"; his "to dis" (to this) more like a prolonged, slightly hissed "tew diss"; his "country" far more like "cone-tree"; and, perhaps the toughest word of the lot, his "coon't" (couldn't) really would roll out sounding far more like the flight of a wayward billiard "cue" with an "n't" tacked on—that is, "cuen't." Finally, the poor writer still would be on the ropes trying painlessly to convey that priceless soft "g" in "engen-neer." Oh yes, and Olaf's "now" would emerge more like "noo."

All this and I've still ignored the high notes in his aria which are, taking my version—though I still despair of conveying all the subtle differences—"iss," "twenty," "yar," "com'," the first syllable in "country" (his "cone-tree"), his "coon't," of course, the first part of "engen-neer," and finally that innocent "are" and the "tank" in "tank you." Then why, one may ask, didn't I write it Olaf's way in the first place? All right, here goes (or "hare gues," as Olaf himself would say), as promised, and for confusing good measure I'll italicize the key words or syllables as meanwhile you brace yourself.

"Fack *iss,* brudders, *twenta*-sax *yar* agoo ven Ay *comb* tew diss *cone*-tree Ay *cuen't* say *engen*-neer an' *noo* Ay *are* vun! *Tank* yew." Olaf himself probably couldn't follow this, if obliged to read it, while the average unclued reader doubtless would have to be shaken awake.

"Engineer" is the key word in Olaf's story as well as one of the toughest of the lot to convey in dialect. No self-respecting, old-country Swede could for the life of him pronounce it right, and yet here the dialect writer simply dare not indulge in compromise, as I so cravenly did with "country." For if I'd closed my eyes and had Olaf say "engineer" (as I do phonily have him say "country") I'd not only be going too far with my faking but would ruin the whole point of the story. That wry point, of course, is that after 26 years in this country Olaf *still* couldn't say "engineer." So, you see, if the dialect writer flunks on one key word he may not only court spoiling the whole passage but risk imperiling much of his credibility with the reader.

As Olaf himself might be tempted to put it, "Diss hare crasszy dialeck-vriting bassiness iss gatting so tankled opp vit pollytacs an' all dat taffy Ay'm gatting sack an' tarred an' tank Ay'll yust shuck do whoole gol dang ting an' goo fashshing instad. Gootpye."

*Retired Michigan Supreme Court Justice John D. Voelker always wanted to be a writer, and now—as Robert Traver, author of *Anatomy of a Murder*—he are vun.

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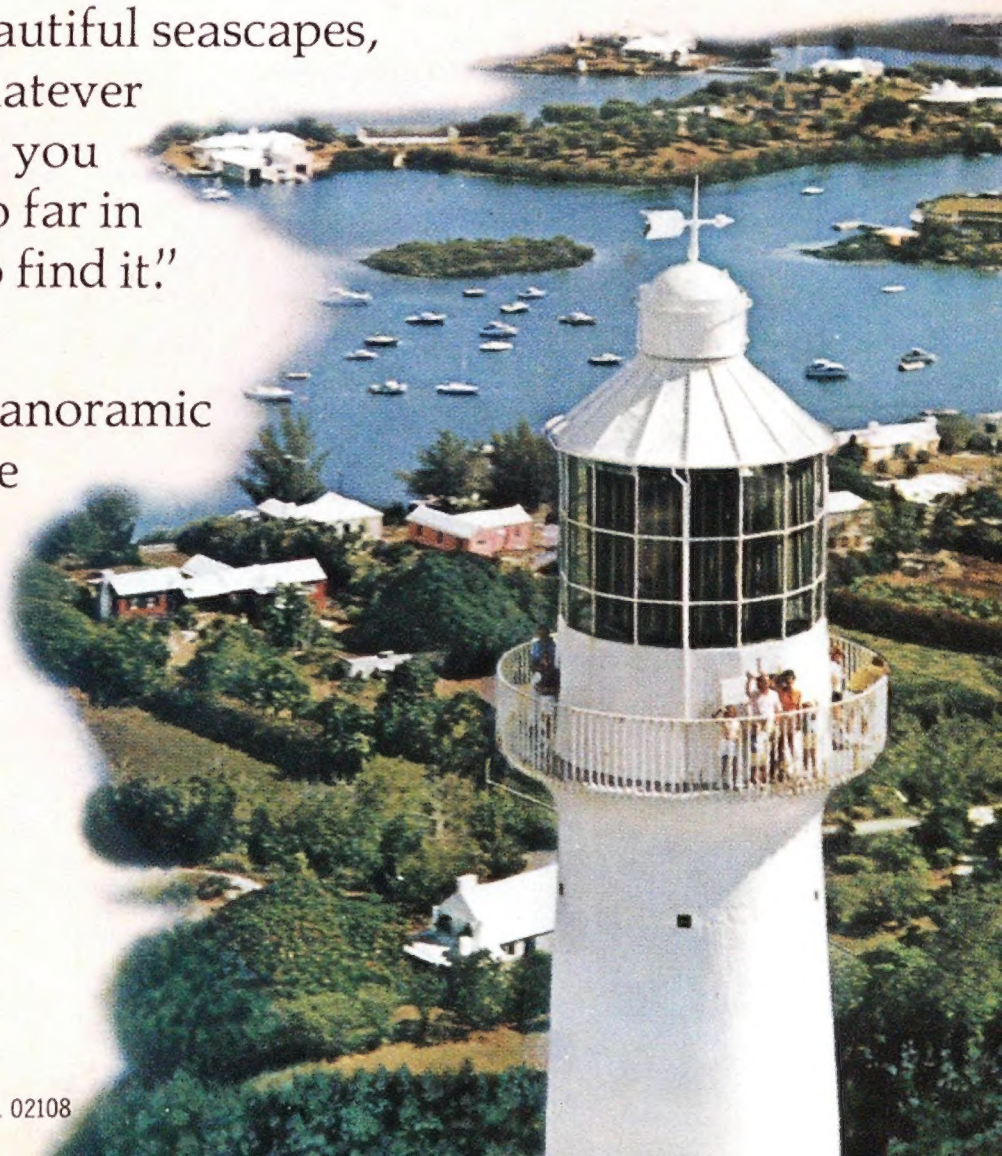

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